The Builder.

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Disposal of Sewage from Isolated Buildings.

I.

TIME was,—and that not long ago,—when an architect asked for nothing better than a brook or river into which to pour the sewage of a house, or, if a stream were not available, was quite content to build a cesspool and open the drains into that. But so much has been done in recent years towards the healthy disposal of the sewage of large and small towns and villages, and so much experience has been gained, that there is now little excuse for ignorance on the subject. It is not likely, either, that towns which have been at considerable expense in properly treating their own sewage, will long continue to permit the river flowing through their midst to be laden with the filth of villages and houses nearer its source. It is satisfactory to know that many rivers are less foul than they were ten or twenty years ago, but it is to be hoped that in the coming days of Watershed Boards, keenly alive to all kinds of river pollution, it will be utterly impossible for any one to pass crude sewage into a stream with impunity.

The problem here considered is,—to dispose of the sewage of a large country building in some way other than that of pouring it into a public sewer.

The simple method of passing the crude sewage into the nearest stream is not worthy of consideration; for, if one building were permitted to do this, there would be no valid reason why a hundred others should not do the same, and although a clear running stream of moderate size would of itself be sufficient to purify by oxygenation the sewage of one or two mansions, yet it would not purify that arising from many mansions, but would itself become foul. The total quantity of crude sewage poured into a stream ought not to exceed 5 per cent. of the amount of water in the stream.

The other simple expedient,—a cesspool,—is also, or ought to be, obsolete. Cesspools have long been condemned in towns as dangerous to health, but in many country places they are still permitted to exist, and, doubtless, to contaminate, by secret channels and by simple percolation, the water supplies of the district. They have had their day; it is high time that they ceased to be. It is not damp mineral subsoil that will purify sewage, but chiefly the upper soil in which plants live, and to which sun and air can give their vivifying powers.

The remaining methods of sewage-disposal may be divided broadly into two classes,—the *first* including those which require the addition of certain materials to the sewage, and this may be called *the chemical treatment;* and the *second*, which we will call *the natural treatment*, consisting of those which depend entirely upon the natural properties of air, earth, and plants.

The number of processes comprised in the first class is legion. Some were tried long before the opening of this century, and during the century many wonderful discoveries have been made, which were to have had instantaneous effect in purifying sewage and freeing us from all smells and nuisances resulting therefrom, for ever and ever; nay, more, we have been over and over again induced to believe that sewage treatment by this or that patent process would bring reward to towns not only in health, but also in actual hard cash. Patentees have discovered this if nothing else, that the problem is not as easy of solution as they thought. Of the hundred or two methods which have been successively advocated, probably not more than a score are in actual use to-day, and of this score perhaps the really useful ones could be counted on the fingers of one hand. Blood, charcoal, tar, dried seaweed, lime, iron, herring-brine, carbolic acid, bleaching powder, and a whole laboratory of other substances, some with brand new names, have been added to sewage to purify it, but most of them have achieved no more than a temporary success. They have proved either too costly or of doubtful advantage.

The places in which chemical treatment may be adopted were specified by the Royal Commission on Metropolitan Sewage Discharge (1884) to be those "where the quantity of sewage is not very great, where the sewage can be promptly treated, and where there is a running stream into which the effluent can be discharged, in a proportion not exceeding 5 per cent. of the supply of fresh water."

In nearly all chemical processes, the "chemical" or precipitant is added to the sewage by means of a more or less complex arrangement, frequently self-acting, and the two are thoroughly mixed by mechanical agitation, or by passing over "salmon-ladders" or between baffling-plates. The compound is run into a tank, and allowed to remain there undisturbed for two or three hours, during which time the heavy suspended particles, such as road-detritus, settle of themselves, and the chemical is also hard at work decomposing the sewage, precipitant and precipitates forming part of the general "sludge" at the bottom of the tank. The liquid is then drawn off (by means of a floating arm, so as not to disturb the sludge), and is passed over land or through prepared filters. Sometimes the chemically-treated sewage is allowed to flow continuously, but gently, through the tanks without any period of absolute quiescence; the method previously described is, however, preferable.

It is evident that some further treatment is required before the effluent from precipitation-tanks can be considered pure enough to be discharged into a stream.

In the *natural treatment* of sewage there are two principal methods, one known as *Surface* or *Broad Irrigation*, and the other as *Intermittent Downward Filtration*.

Mr. Denton's definitions of the two methods are worth quoting:—Intermittent downward filtration is "the concentration of sewage *at regulated intervals* on as few acres of land as will absorb and cleanse it without preventing the production of vegetation." "Surface-Irrigation means the distribution of sewage on as many acres as it will wet without supersaturation, having in view a maximum plant growth." Or we may say that the former aims at the purification of sewage by the natural filtering powers of the earth assisted by vegetation, and that the latter tries to effect the same object by the natural absorptive powers of vegetation, assisted by the

earth; in both, sun and air play an important part.

The fact is that so many chemical processes have proved to be failures, that inspectors and engineers generally are now chary of adopting such a method, though its efficiency be declared by any number of chemists' analyses, and so forth. Precipitation by chemicals is admitted to be beneficial, but the effluent must be further purified. This points to a combination of the two modes of treatment,—*chemical* and *natural*.

For intermittent filtration, the ground is deeply under-drained, and the surface formed into a series of closely-set ridges and furrows. Into the latter the sewage is turned; part of it evaporates, part is absorbed by plants, and the remainder, purified in its passage, penetrates down to the drains, and is carried away by them to the nearest river or other available outlet. On the ridges,—out of actual contact with the sewage,—vegetables, roots, and grasses of various kinds are planted, and feed upon the sewage which spreads about their rootlets. It is, however, absolutely necessary that the filtration be intermittent, or the ground may become so sewage-soaked that the liquid pouring from the under-drains may be little or no purer than the sewage itself. At least two series of furrows must therefore be formed, into which the sewage can be turned alternately, but it is found better in practice to have three or four series in order that each one, after use, may be well dried and aërated before it is again called into requisition. The length of time during which one series of furrows will continue to purify the sewage varies according to the nature of the ground, and also according to the quantity and quality of the sewage. A clayey or peaty soil may become sodden in a few days; a light sandy or loamy soil may continue useful for several weeks. The sludge which remains in the furrows after the liquid has passed away should be dug into the ridges.

For broad irrigation, the ground may or may not require under-draining. If it be naturally somewhat wet and heavy, under-drains will be a necessity, as they are in many cases even where no extraordinary amount of moisture is poured upon them; but they need not be as deep or as close to one another as in ground laid out for intermittent filtration. The sewage is turned into small furrows, which are cut about ten or fifteen yards apart, and between these the moisture spreads laterally among the roots of the herbage or other produce, which is growing upon the farm; the effluent passes off by a carrier running along the bottom of the irrigated plots. This method of sewage disposal is a great improvement to light, sandy soils, as at Worksop and at Abingdon, where the sewage-farm is let at an annual rent per acre almost double that of neighbouring farms.

A third method of land treatment, used perhaps oftener in America than in England, is that known as *Sub-Irrigation*. The method has its advocates, but it is not equal to either of the other systems of land treatment, and a brief description will therefore be sufficient. Unsocketed drain-pipes, 3 in. or 4 in. in diameter, are laid (sometimes in earthenware channels or half-pipes) at a depth of 10 in. or 12 in. below the surface of the land; the sewage, after being screened, is turned into these pipes, and spreads from them into the surrounding soil, and is, in great part, absorbed by the vegetation upon the surface. In some cases under-drains, 4 ft. or 5 ft. deep, are required to prevent the land becoming swampy.

Advantages and disadvantages are to be found in nearly all the methods of treatment, and a statement of the more important of these will lead to an intelligent consideration of the subject. Any process, of course, of which the effluent is not within the limit of impurity fixed by the Rivers Pollution Commissioners in 1870 is at once put out of court.

The chief advantages claimed on behalf of chemical treatment are these:—The sewage is acted upon rapidly, and either before or immediatly after its arrival at the outfall, before putrefactive and unhealthy organisms have had time to develop and propagate; the precipitant deodorises, and, at any rate partially, disinfects the sewage; and the process of purification is not dependent on a great number of variable circumstances, but is approximately regular. The disadvantages most commonly alleged against chemical processes are the following:—Lime, often used as a precipitant, gives rise to many nauseous smells, and results in the release of an impure effluent; the deodorisation and disinfection are at best only partial; the sludge is often difficult to get rid of, having little or no manurial value; and during a severe rain-storm, a great part of the sewage passes into the river without any treatment at all.

Some of the reasons advanced for and against land-treatment may be gathered from the preceding paragraph. It is said that disease-germs are spread through the atmosphere by passing crude sewage over land; that man and beast partaking of the produce of sewage farms may become tainted with some infectious disease, which is conveyed by sewage adhering to the vegetation; that the process of purification is dependent on many variable circumstances (such as frost, sodden condition of the ground after heavy rain, state of the crop in summer and autumn, absence of vegetation in winter, and so on), and therefore a pure effluent cannot be ensured; that the ground becomes sewage-sick, or choked with filthy slime, fit haunt of myriads of sewage-worms; that the surrounding atmosphere is laden with intolerable smells; that the quantity of land required for broad irrigation entails enormous initial expenditure, and, in populous valleys, a continuous expense in pumping, which more than counterbalance the profit made by farming the land. On the contrary, it is declared that the purification of the sewage, if slow, is sure in works properly designed and managed; that there is no danger of conveying disease by the vegetation, or of choking the ground, due care of course being observed; that the land purchased can at any time be sold for as much as or perhaps more than it cost, whereas money spent in "works" is, if the works be abandoned, entirely lost.

There can, we think, now be no reasonable doubt that precipitation is beneficial, that deodorisation and disinfection are highly desirable, and therefore that simple land-treatment, while sufficient under many circumstances, and with sewage not too nasty, is not a perfect solution of the problem of sewage-disposal. It is equally true that no process of chemical precipitation has yet been *proved* sufficient of itself to produce in all cases an effluent pure within the meaning of the Rivers Pollution Act. A combination of the two methods is, therefore, often necessary,—either precipitation and filtration, or precipitation and irrigation, the preciptant having the power of deodorising and disinfecting the sewage to some considerable extent. As we have said before, the disinfection of the sewage from hospitals for infectious diseases is an absolute necessity, and any scheme for disposing of the sewage of a mansion, school, or other institution within a short distance of the building would be lacking if deodorisation were not effected.

Before we describe any of the processes in detail, it will be best to ascertain the quantity of sewage which may be expected to arise from a given building, and at the outset it must be decided whether the rain-water shall all be admitted to the sewage-drains or shall be partially or wholly excluded. The subsoil water also must be considered.

In broad-irrigation works on light soil, it does not matter very much whether the rainfall be excluded or not, provided the area of land be large enough. Town-sewage frequently cannot be utilised for irrigation, unless it be raised by pumping, as the available farm-land lies higher than the sewer outfall. In such cases, the admission of rain-water to the drains entails increased expenditure in pumping, and either necessitates the construction of large tanks, in which storm-water can be stored until the pumps are able to deal with it, or permits a large volume of mixed sewage and rain to pass untreated into the river. These are the chief arguments uttered against the single system of drainage in conjunction with irrigation, but they are not of much force in our present inquiry, as broad irrigation will seldom be adopted for an isolated building if pumping be thereby necessitated. Certainly irrigation has, in more than one instance, been employed under such circumstances, the pumps being driven by turbine or gas-engine, but nowadays there are chemical processes which would achieve a satisfactory result more economically.

There is another objection, however, which cannot be overlooked—to wit, an excess of water will prove injurious to the crops in certain stages of their growth. For this reason, unless the available ground be of considerable extent, so that the excess can be widely spread, it is wise to exclude rain-water as much as possible. Architects will do well, in any case, to exclude that portion of it which, falling on roads, paths, and yards, will carry with it much sand or dust, as these ingredients may do more harm than good to the land.

But if intermittent filtration or any chemical treatment be adopted, the whole of the rainfall ought, where practicable, to be excluded from the sewage-drains, and, in any case, only so much of it should be admitted as is absolutely necessary to flush them. The portion so included should be gathered from the cleanest and least friable surface available, which is the roof. The presence of a large quantity of rain-water in the sewage increases the cost and difficulty of treatment at the outfall, and sand increases the amount of sludge, and lowers its quality.

The rain-water should never be admitted in driblets, but should be collected at the head of each system of drains where necessary, and discharged rapidly by means of an automatic syphon. Waste-water from baths and lavatories, which is frequently almost pure, should be utilised for flushing in the same way, and if these fittings are at or near the head of a system of drains, there will be no need to admit any rain-water at all into that system.

It is scarcely our province in this article to speak of the drains themselves, but one or two points, perhaps, may be mentioned with advantage, as drains properly made can be kept clean far more easily and with a smaller quantity of water than ill-made ones. Let the drains have as great a fall (in reason) as possible; gradients varying from 1 in 30 to 1 in 50 give good results with 6-in. pipes; but where such gradients cannot be obtained, get the best possible, even at the expense of a considerable amount of digging. The drains should be laid in straight lines wherever practicable, and all branch drains should have a drop of 3 in. or more into the main. Care should be taken to prevent the settlement of drains crossing soft places. The drains should be as small as possible, and not, as used to be the custom, as large as possible; a 6-in. drain is amply large enough to take the sewage from almost any mansion. Other points might be mentioned, but these are enough for our present purpose. The aim of the architect ought to be to secure drains of such gradients and so well laid that the sewage itself will keep them clean; for all additional water added for cleansing purposes, whether it be rain-water, subsoil-water, or actual service-water, increases the difficulty of treatment at the outfall.

With reference to the subsoil-water, we may say that it is best excluded from the sewage-drains, and connected with the drains which convey the superfluous rain-water from the roofs, and the surface-water from the roads and yards. The whole of the drains, from the building to the outfall, ought to be well jointed in cement, in order to exclude the subsoil-water throughout their extent, and also to keep out the sand and other solid matter, which in light soils would

be conveyed into the drains by the subsoil-water.

We will suppose that the sewage of a mansion has to be dealt with, and that there are two sets of drains discharging into a main drain, which conveys the sewage to the outfall. At the head of one system of drains, one or more lavatories and baths occur, and the waste-water from these is stored and automatically discharged for flushing purposes. At the head of the other system, which includes the sewage from the stables, it is considered necessary, on account of the flat gradients, to gather rain-water for that object. The sewage from an entrance-lodge is conveyed into the drain from the mansion, and, assuming the branch-drain to be short and of good gradient, no additional rain-water requires to be admitted.

The drain from the stables, if well made, will be sufficiently cleansed by a flushing-tank discharging forty gallons at intervals of, on the average, two days, and from this we can easily calculate the horizontal area which will supply the quantity of rain-water required.

The amount of rainfall varies very much in different years and in different localities; in nearly every district a record is kept by some person or other, and this should be studied before designing sewage-works for that neighbourhood. For purposes of calculation we will take the mean English depth, which is 30 in. per annum. At this rate an area of about 52 square yards will receive sufficient rain to fill the flushing-tank on the average every alternate day. A portion of the rain will, however, be absorbed or evaporated, and will, therefore, never reach the drains; to allow for this we must increase our gathering surface by one-half, *i.e.*, we must make it about 78 square yards. During a very dry season the tank might be filled occasionally from the water-supply of the house.

But the rain, which is so good a friend in cleaning our drains, on occasion behaves somewhat treacherously, and pours down in such a flood as to disarrange our outfall works, if great precautions have not been taken against its impetuosity. The mean daily rainfall is about one-tenth or one-twelfth of an inch, but sometimes a fall of 1 in. takes place, and it is recorded by Mr. W. H. Watson that a phenomenal fall of 2·33 in. occurred on November 30 last year at Braystones, in Cumberland. At one observatory known to us, the greatest rainfalls in a day recorded for the last four years are ·91 in 1887, 2·19 in 1888, ·87 in 1889, and ·98 in 1890, while the greatest rainfalls in a week were for the same years 1·67, 3·14, 2·30, and 1·84 inches respectively. From these figures it will be seen that a rainfall of more than 1 in. in a day is not of very frequent occurrence.

In the mansion under consideration, an inch of rainfall on the gathering surface of 78 square yards will yield (neglecting absorption and evaporation) 365 gallons, and for a considerable portion of this quantity provision must be made at the outfall.

The quantity of sewage which may be expected to arise from the building must next be considered. In the case of existing buildings, the actual volume of sewage can be ascertained without much difficulty by gauging it with a large cask, but in designing outfall works for new buildings an approximate estimate only can be made. Many causes combine to render it difficult to ascertain the quantity with any exactitude. The water-supply is an all-important factor; it may be very plentiful, or strictly limited. The number of occupants in proportion to the size of the building, the habits and condition of the occupants, the number of horses and carriages, and other causes also require to be taken into consideration. In fact, each building will differ in the quantity of its sewage from every other; a school containing 100 or 200 boarders will produce less sewage per occupant than a hospital, and this, probably, less than a mansion.

The daily quantity of sewage from towns is usually about 30 gallons for each inhabitant, but sometimes is only 20 gallons, and sometimes reaches even 40 gallons,—exclusive of rainfall. It must be remembered, however, that a great part of the sewage of towns consists of waste-water and liquid refuse from manufactories, and also of subsoil water. But it must also be remembered that the occupants of a mansion will use much more water than the same number of cottagers, and these latter form the greater part of the population of many of our towns. We shall probably not be far wrong in saying that the sewage arising from an ordinary country-house will be about 25 gallons or 30 gallons for each occupant daily. The total quantity must of course be calculated on the basis of the greatest number of persons which the building is designed to accommodate.

One mansion, the sewage of which is now being treated by a chemical process, has twelve occupants, and the daily flow of sewage is about 500 gallons; in this case, all rainwater is excluded. The sewage arising from the barracks at Chichester is usually about 15 gallons daily for each inhabitant, exclusive of rain and subsoil-water, but in the dry summer of 1887 the quantity dwindled to less than 10 gallons.

Assuming the mansion under consideration, together with its entrance-lodge, to provide accommodation for eighteen persons, we may estimate the total daily sewage to be about 500 gallons. The quantity of rain falling on the gathering surface of 78 square yards will, as previously stated, be about 365 gallons. From these data, we can calculate the size of tanks required, and also the quantity of ground for land treatment.

Another—and, perhaps, better—way of ascertaining approximately the probable quantity of sewage is to calculate the amount of water required for the occupants of the mansion, and for the horses and carriages. According to Hurst, 15 gallons should be provided daily for each man, woman, and child; 16 for each horse; 16 for each four-wheeled carriage, and 9 for each two-wheeler. A mansion and lodge, therefore, in which eighteen persons reside, and whose stables contain five horses, two four-wheeled carriages, and two two-wheelers, will require a minimum water supply of 400 gallons daily. Evidently the amount of sewage previously stated,—500 gallons,—may be considered not far from the mark.

We must now decide upon the treatment to be adopted. This decision will depend largely upon the extent of the ground appertaining to the building, upon the nature of the ground, and lastly upon the quantity and character of the sewage.

It is probable that the owner would object to any scheme of disposal, in which the sewage was openly exhibited over a somewhat extended area within a few yards of his mansion. The sewage might not create a nuisance, from a sanitary inspector's point of view; there might not be any appreciable smell arising from it, or any danger to be feared to the health of the occupants of the mansion; but the mere fact of seeing it might be a sufficient objection in the eyes of the owner. Cesspools are out of sight, and therefore out of mind, and this is probably one reason why they have been so generally used.

Most people have quite a wrong notion of sewage-works. It is thought that they *must* be the filthiest and most evil-smelling places the sun ever shines on, and it may be that the architect will have hard labour to disabuse his client of such a notion. The best way to do it will be to take him to see one or two good examples,—be sure they are good examples,—and very likely the client will return surprised from the visit. He will learn that a greater nuisance is often caused by the agricultural operations of leading, stacking, and spreading farm-yard manure than by any well-conceived and well-managed scheme of sewage-disposal.

There is really not much danger of any smell being perceptible at a distance of 100 yards from either irrigation or filtration works which have been well carried out and are well cared for, but it is not advisable to dispose of sewage in either of these ways within 200 yards of the building; and then it will be a wise precaution to screen the works by a group of trees, so that they may be hidden from view, and also so that the danger of smell being carried by the wind to the house may be minimised. Mr. E. F. Bailey-Denton, in his "Handbook of House Sanitation" (1882), says: "In order to avoid even the idea of nuisance, the land selected for sewage-treatment should be situated at a distance of two furlongs or more from the dwelling, though in the cases of certain public asylums and hospitals much less than that distance has been found by experience to be quite sufficient." For some reasons, of course, the greater the distance is, the better, but certainly we think that, if it be made a condition that land-treatment shall not be adopted within a quarter of a mile of a house, it will very seldom be adopted at all. The cost of such a length of drain will be considerable, and will often more than counterbalance the additional cost of chemical outfall works; and, besides this, there are many buildings which have not such an extent of ground around them. The irrigation area laid out by Mr. Rogers Field, in connection with the Charterhouse Schools at Godalming, is about 250 yards from the building, and in other instances irrigation has been adopted within half this distance of the mansion whose sewage is under treatment.

Cases are said to have occurred in which dysentery and other diseases have been produced by emanations from sewage-farms, even in persons living 300 yards away from the irrigated land; the neighbourhood of the Croydon sewage-farm has suffered largely from typhoid fever, caused, as some say, by the farm, or, according to others, by a polluted water-supply. There are, however, many instances of land-treatment, which have created neither nuisance nor disease, as far as can be ascertained. Thus, the manager of the Bedford Sewage Farm recently reported that neither epidemic disease, sickness, injury, nor annoyance had been experienced by the eight persons living on the farm, or the twenty persons working on it, although some of these were children. Other instances could be cited.

A distance of 200 yards from the building ought, therefore, to prove sufficient for the land-treatment of a moderate quantity of not too nasty sewage, but if the grounds of the building be of so limited an extent that the sewage must be treated within this distance, a chemical treatment ought to be adopted. In the case of such buildings as the last, it is sometimes possible to make arrangements with the owner of an adjoining farm, that the sewage shall be turned upon his land and utilised there for broad irrigation.

The area of the ground required for the actual disposal of the sewage should be considered in this connexion. In designing sewage-disposal works for towns, it is usually calculated that one acre of ground laid out for intermittent filtration, will, according to its suitability, purify the sewage of 250 to 1,000 persons, and that the same area, laid out for broad irrigation, will be required for 50 to 100 persons; that is to say, the sewage of our mansion and lodge would require for its purification by the former method, an area varying from about three to twelve perches, and by the latter, from about twenty-nine to fifty-eight perches. It is extremely bad policy to prepare and use too little ground; the higher figures in each case had therefore better be taken, if the ground be only moderately suitable, in order that due intermittency of action can be obtained not only for filtration but also for irrigation.

The nature of the ground is, we said, another point to be considered in selecting a mode of treatment. A heavy clay is quite unsuitable, without special preparation, for sewage disposal; its further power of absorption is too small, it resists the aëration which is so necessary a part of the purifying process, and, in addition, frequently cracks, and thereby permits the sewage to enter the underdrains with scarcely the least purifica-

tion. A peaty soil has also only a limited power of absorption, but, if well drained, is an excellent purifier. For another reason, namely, lack of retentive power, coarse gravels are to be avoided.

Attempts have been made to render even stiff clay useful for filtration purposes, by repeated ploughing and mixing with fine ashes, but such prepared ground is of doubtful efficiency. It must always be remembered that it is the soil in which plants will thrive to which we must look chiefly for purifying power, and it will be better and, in the end, cheaper to adopt a good chemical process, rather than attempt to purify sewage by passing it over land quite unsuited to the purpose. The sewage-farm at Featherstone, near Leeds, proved a nuisance, and, after examining it in 1888, Mr. Paterson, C.E., of Bradford, reported "that the twenty-five acres of land now leased to the Board for sewage-irrigation by gravitation are useless, being 4 ft. or 5 ft. of strong and intractable clay, with no soil worthy of the name."

The best soil for both irrigation and filtration is, said Mr. J. Bailey-Denton in 1880, "a sandy loam, with a small proportion of gritty gravel to quicken percolation." Any soil naturally fertile is suitable, and there is no reason why the kitchen garden of the mansion should not be arranged in ridges and furrows to take the sewage by intermittent filtration; or, to put it another way, the sewage-disposal works may form the kitchen garden of the house; great care must be taken, however, that the sewage, even in the severest storms, does not flood the vegetation.

The third point to be considered is the quantity and character of the sewage. A small quantity of sewage (say from a villa or small mansion) can be best and most economically utilised by broad irrigation, if there be sufficient and suitable ground far enough removed from the house. Greater volumes may be disposed of in the same way, but at a greater distance. If the quantity of sewage be too great to be properly treated on the area of land available, intermittent filtration may be adopted; if too great for this, chemical treatment is necessary.

The sewage from hospitals, more especially those for infectious diseases, must be chemically treated either before or immediately after reaching the outfall, so that it may be thoroughly deodorised and disinfected at once; the effluent may then be passed through filters or over land without danger. The sewage can be further disinfected, and used for manure.

To sum up,—a process of deodorisation and precipitation by chemicals is necessary (1) where *sufficient* land is not available for natural treatment, (2) where *suitable* land for natural treatment cannot be obtained, and (3) where the sewage requires to be quickly disinfected because of the disease-germs which it contains. In other cases, one of the natural processes (or the two in combination) will be found sufficient, and at the same time simpler, and less costly to maintain; the difference in cost, however, will be a mere trifle, and a chemical process is not so difficult to carry on but that an ordinary farm-labourer can easily learn to do the work. In fine, we may say that, if the whole or a very large part of the rainfall be excluded, a good chemical process is suitable for any building and under any conditions, while land-treatment cannot without danger be universally adopted.*

REREDOS, ST. MATTHIAS' CHURCH, PLYMOUTH.—The new reredos presented by an anonymous donor to St. Matthias Church, Plymouth, was dedicated on the 28th ult. The reredos, made entirely of oak, was executed by Mr. Harry Hems, of Exeter. The design was prepared by Mr. George H. Fellowes Prynne, of London.

PEOPLE'S PALACE, EAST LONDON.—The distribution of prizes awarded by the Worshipful Company of Plumbers to the students of the People's Palace Technical Schools Plumbing Classes will be made by Mr. W. H. Bishop, Master of the Plumbers' Company, on Monday next, April 6, at 8.30, when Sir John Henry Johnson, Master of the Drapers' Company, will preside.

* To be concluded in our next.

A CRITICISM OF RAILWAY LEGISLATION.*

THAT this somewhat prosaic subject is capable of being handled in a manner at once interesting and instructive is proved by the volume before us. Indeed, no one who has read "The Railways of England" will hesitate to follow Mr. Acworth again upon his favourite subject, even though in the present work he deals with but one phase of it,—the burning question of rates and charges. We are at the outset reminded of the fact that there has never been anything like the amount of public interest taken in railway economy here as in Continental countries,—a consequence of the political effects of State ownership, which forces the question upon legislators and their constituents, as well as those more directly interested. The bulk of our railway literature has appeared during the last few years, and we can still point to but very few works of reference upon this subject. Indeed, we can call to mind only one,—that written by the late Mr. Grierson, of the Great Western, by the side of which the present volume will take its place,—which treats of railway rates from a railway point of view. Mr. Grierson wrote just after the failure of Mr. Mundella's Railway Bill, while Mr. Acworth's work opportunely makes its appearance at a time when the Act of 1888 is just entering upon one of its most important stages.

The author has arrived at the same conclusion as Lord Stalbridge as to the probable effect of the Board of Trade Provisional Orders, and considers that they will be so disastrous to the companies as to justify them in declining to extend their operations any further. He contends that "on mere grounds of expediency it is not only not in the interests of the railway companies, but also not in the interests of the railway customers, whether they call themselves traders, or whether they be merely members of the consuming public, that the proposed Provisional Orders of the Board of Trade shall be sanctioned." Admiration is expressed for the patience and ability displayed by Lord Balfour and Mr. Courtenay Boyle in the performance of their arduous task, but it is considered that they were placed in a most unjust and unreasonable position by the Act of 1888. "They were compelled to act at their own discretion, unguided by precedent, and unfettered by instructions," and the result, from a railway point of view, is regarded as very unsatisfactory. The most hopeless feature of the case, as presented by Mr. Acworth, is that, with a few exceptions, nobody will feel the benefit of the compulsory reductions in their carriage accounts which the new schedules will effect—"it will be frittered away in driblets of a few pence here, and a few shillings there."

The arguments leading up to these dismal conclusions are illustrated by amusing comparisons and queer similes, which render the book interesting to the ordinary reader, as well as to those more directly concerned; while the points are, perhaps, forced home more surely by these means than they would have been by the use of columns of imposing and unassailable figures. We may quote an example:—"Here is an instance of rate reduction based, not on practical considerations, but on abstract theory. The Great Northern rate for musical instruments from London to Knebworth is 25s. The Board of Trade report proposes to reduce it to 24s. 3d. Now, it is tolerably safe to say that if Lord Lytton wished to buy a new grand pianoforte, he would not be deterred by the fact that he would have to pay 12s. 6d. for carriage. Nor, if he found the charge brought down to 12s. 1½d., is it likely that the unexpected economy would induce him forthwith to purchase a second. In a word, a pettifogging alteration such as this,—and this is only a type of hundreds and thousands,—simply means to the railway a dead loss, with no prospect of recoupment from increase of traffic, and to the customer a gain so infinitesimal that nine hundred and ninety-nine times out of a thousand he will be utterly unconscious of it."

English railway rates, Mr. Acworth maintains, must remain comparatively high, for reasons most of which had been already urged by Mr. Grierson. But our author gives special prominence to the enormous expense incurred by our railways for speed and safety as compared with other countries. As to the latter point, he remarks upon the fact that English railways, with their crowded lines, and in a climate in which for months in the year dense fogs are of almost weekly occurrence, carry on their traffic at one-third the risk, whether for passengers or employés, which is incurred in America. The way in which American citizens have to risk their lives and limbs at railway crossings and on unsafe tracks is certainly astonishing to English visitors; but we pay a heavy price for the protection we enjoy. Mr. Acworth says, "The cost of establishing and maintaining the block system alone would go far towards furnishing the entire 'maintenance' expenditure of an American railway. If we added the money spent on ballast which shall not subside, and bridges which shall not break down under an advancing train, it would more than do so. Not that the English public is contented even now, but it must understand that any excess cost incurred in the further protection of its skin must come in the long run out of its pocket."

The references to American railways are numerous and instructive, and in addition to quotations from eminent American authorities, many observations are introduced suggested by the writer's own experiences on the other side of the Atlantic. Mr. Jefferds,—for we presume that he is the gentleman referred to on p. 238,—is charged with ridiculous exaggeration in respect to the saving in working expenses which he alleges would follow the introduction of his favourite bogie trucks, some of his theories being pulled to pieces in a most amusing, and, at the same time, convincing manner. Professor Hunter is also freely criticised, as is the Report presented to the Lancashire and Cheshire Conference; the book being apparently directed largely against this Report, and the Professor's work on the Railway and Canal Traffic Act,—much in the same way as Mr. Grierson's book was a reply to Sir B. Samuelson's pamphlet comparing English and foreign lines.

We are not at all surprised that Mr. Acworth has pilloried the words of the Berwick gentleman who told the Board of Trade that "what we want is to have our fish carried at half present rates. We don't care a —— whether it pays the railways or not. Railways ought to be made to carry for the good of the country, or they should be taken over by the Government. This is what all traders want and mean to try and get." This is outspoken, unreasonable selfishness, and we are quite sure that such sentiments are not entertained as extensively as was implied by the speaker; but Mr. Acworth asserts elsewhere that we are, in this matter, selfish as a nation, and that the outcry against special import rates is a proof that "by nature all men are protectionists at heart." This is his way of putting it. He alludes, in the first place, to the fact that the Parliamentary Committee of 1882 justified a low rate for fish from Wick. Sir Thomas Farrer once stated on this point that, being accustomed to consider the interests of the consumer very largely, he would certainly encourage the railway company in bringing Shetland fish to the London market, even though the effect of it were to lower the price of the Grimsby fish. Now it is a matter of history that a low through rate for hops from Boulogne, which had been granted under precisely similar conditions, had to be withdrawn in consequence of public agitation, "the attempt of the company to earn an honest halfpenny,—

* "The Railways and the Traders: a Sketch of the Railway Rates Question in Theory and Practice." By W. M. Acworth, M.A. London: John Murray. 1891.

a penny being absolutely unattainable under the circumstances—being received with a perfect storm of indignation. Can the outcry be explained," proceeds our author, "except as an instance of the natural and corrupt love of Protection implanted in the human breast? And against such a reappearance of the old Adam ought not the Cobden Club to have entered its solemn protest?" Regarding the foreign fruit traffic which, it will be remembered, the railways had to lose in a similar manner, it is observed that "the German cherries which the Dutch boats brought over from Flushing to Queenborough, and which formerly Chatham and Dover trains brought up from that point, now come all the way by water. The barge owners on the Medway and Thames gained, it may be presumed, the profit which the Chatham and Dover lost; the London doctors, too, perhaps gained something, as the cherries mostly arrived somewhat the worse for their journey. But where the advantage came in, either to the London consumer or to the rival Kent producer, is by no means so apparent."

We notice a slight error at p. 28, where the writer, remarking that "to load a ton of tea is one thing, and to load a ton of furniture is quite another," adds, "tea and furniture stand side by side in the fifth or highest class of the classification." As a matter of fact, tea is in the third class, and has never been classified with furniture,—unless we go back to the curious jumble which defines the highest class under the old Acts of Parliament, viz., "Fish, feathers, canes, cochineal, household furniture, hats, shoes, toys, and all other matters, articles, and things."*

Mr. Acworth is close up to date, dealing *inter alia* with the Manchester Ship Canal and the M. S. and L. extension to London, the Scotch strike, the Taunton accident, and other incidents of recent occurrence.

NOTES.

THE correspondence which has passed between the Institute of Architects and their opponents in regard to examination, which we reprint in another column, appears to us only to confirm what we have said as to the unreasonable and illogical position of the latter. Because architecture, as an art, cannot be subject to examination, they wish the Institute, apparently, to give up their system of examination in construction and in general education as a condition of membership. If a man is to be entrusted with the construction of buildings as well as with their design, what harm is to be done by an examination to test his knowledge of construction? There can be no question that such an examination is likely to raise the scientific and educational standard of architects in future, and certainly it cannot in itself impair their artistic powers.

THE Bill proposed by Mr. Jacoby, which will enable any householder not only to send away an "organ-grinder," but to forbid him to play again within a quarter of a mile of the house, would soon end in practically extinguishing the organ-grinder, though it would be far more logical to aim at a legislation against all street noises in London except under special supervision. However, Mr. Jacoby means well, and deserves all gratitude for his good intentions, which it is to be feared will be frustrated by the would-be philanthropic Philistines. One of these gentlemen, "R. B. B.," already records his displeasure in a most impertinently personal letter in the *Times* of Wednesday (the kind of letter the *Times* delights to print), heaping sneers on Mr. Jacoby as a wealthy Radical who wants to deprive the poor of their "music." Now, no "music" can be produced by mechanical means; music is a matter of expression. The provision of musical entertainment for the poor, on a proper footing, is a cause we would strongly support, but the abolition of the organ-grinder would in fact be the first and necessary step towards it. In regard to others than the poor, there can be no question that the organ-grinder is the great curse and pest of London life; there is nothing like it in any other city we know of; and it is a disgrace to the Government of London that it has not been put down long ago. The organ-grinder is simply the most offensive and intolerable of street beggars, a useless and obstreperous vagabond, who has no claim to public consideration of any kind, and under whose tyranny we have long helplessly groaned. If the *Times* would have the sense to support Mr. Jacoby's Bill, instead of giving circulation to such sentimental nonsense as the letter referred to, it might have an important effect in bringing about the desired object, and would earn the gratitude of all educated Londoners.

* Great Northern Railway Act, 1850.

AS the Commissioners of Sewers will make a public report on the sanitary state of St. Bartholomew's Hospital after their investigation, it would be unfair to prejudge this report. It is very unsatisfactory, however, to find that there are *primâ facie* grounds for the charge which has been of late frequently made against this hospital, that the drainage is bad. Dr. Saunders reports that it is of an obsolete character. In the hospitals of the metropolis of all places in the world it might be supposed that the sanitary arrangements would be found to be perfect. If it is clearly proved that St. Bartholomew's is not in a satisfactory state, it will certainly cause doubt to be raised about the other hospitals of London. It will also show that some kind of Government inspection of hospitals should take place from time to time in order to keep them in a proper state. These institutions are now so large, and so important a part of the social economy of the Metropolis, that once it is found that anything is seriously wrong with their system of management or their structure, it becomes obvious that they should be supervised from time to time by the proper Government department.

A LONG and elaborate Report by Dr. Barry to the Local Government Board (an interim report only, however) deals with the causes of an epidemic of enteric fever in several towns situate in the valley of the River Tees in South Durham and North Yorkshire. The conclusions from the report have an important bearing on the question of water supply from rivers. The inquiry showed that the disease was conterminous with the water supply drawn from the Tees and furnished by the Stockton and Middlesbrough Water Board and the Darlington Waterworks. The daily pumping of the two combined averages 10,500,000 to 11,000,000 gallons. The water is pumped direct from the river into subsidence tanks, and afterwards filtered through sand and gravel before delivery. The following are some of the circumstances noted as bearing on the contamination of the river:—

"On the north bank or Durham side of the river, about half a mile above the intake, is situate the village of Low Coniscliffe (thirty-three houses), the slop drainage from which is conveyed into an open pool or cesspit situate in an old river course of the Tees at a distance of about 50 yards from its present course. During periods of heavy rainfall a certain amount of this slop drainage passes into the river, whilst in very heavy floods the river actually overflows the portion of the field in which the pool is situate. . . . At a distance of six miles from the intake is situate the village of Gainford, containing some 170 houses, many of which are of good class and furnished with water-closets. Part of the drainage of this village is discharged directly into the Tees, but the major portion is conveyed in pipes to an open ditch running down the side of a field and having its outfall into the river. The soil through which this ditch passes is of a porous nature, and during dry weather the liquid portion of the sewage percolates into the land, whilst the solid filth accumulates and forms a black deposit in the bottom of the ditch. During heavy rain this black deposit is carried bodily into the Tees, and upon one occasion when I visited the outfall, a black streak could be clearly observed in the river for a considerable distance. . . . The town of Barnard Castle is reached at a distance of seventeen miles from the intake. Barnard Castle contains over 1,000 houses, and has an estimated population of from 5,000 to 6,000 persons. It is a market town, and during the summer months is a place much resorted to by the inhabitants of the northern sea-coast towns as an inland watering-place. During the spring a regiment of militia undergoes its annual training here, the recruits being billeted in lodging-houses chiefly situate in the lower part of the town near to the river. Nearly 400 of the houses are provided with water-closets. The town has been sewered throughout, and the outfall of the main sewer is directly into the Tees, about half a mile below the town. In addition to this source of pullution there are six privies situate directly on the bank of the river, which discharge their contents on to the foreshore. These privies serve a considerable number of houses, including common lodging-houses and houses in which Militia recruits are billeted, situate in the lowest part of the town. The slop drainage from the majority of these houses is discharged by numerous drains directly on the foreshore, and here also ashes, house refuse, waste building material, and midden refuse have until a very recent period been deposited in considerable quantity. This foreshore during ordinary states of the river varies from 10 ft. to 40 ft. in width, and is only covered when the river is in flood. In the intervals between floods excrement, ashes, slops, and other filth accumulate in very considerable quantity; in fact, the whole of the foreshore becomes covered with a mass of stinking abominations which have to be seen and smelt to be appreciated."

It is also shown that the special outbreaks of enteric fever occurred immediately after the times when the river was in flood, and brought down the deposit from the foreshore. A better disposition of local drainage would of course greatly reduce or even remove the danger, but the report is a very significant one in regard to the theory of regarding open rivers as a natural source of water supply in a populated country.

REFERRING to a paper read at Berlin, by Herr von Miller, describing the aims and programme of the Frankfort Electrical Exhibition, taken notice of in our last (p. 250, *ante*), it may be well to state that perhaps the most important feature of the exhibition will be the attempt made to obtain motive-power from a distant point, thus demonstrating that the motive-power for working ordinary machines giving light, &c, not only for a town, but also for an entire district, can be easily obtained from one central point. In this case, the Neckar waterfalls, which will supply a great part of the power to be employed on the exhibition grounds, are 175 km. distant; whilst another line, constructed on a different system, will start from Offenbach-on-the-Main, running some 7 km.; and the power thus brought to the site will be used for the working of nearly all the more common mechanical appliances of the building, and other trades, commencing with a saw-mill and a smith's shop, and ending with a flour-mill, giving the visitor a picture of what might be done for a small provincial town, distant from a coal-mine, a water-way, or other means of obtaining motive power. Architects who visit the Exhibition will find examples of all kinds of elevators and lifts, and in the "Light" division they will find a practical demonstration how to light a theatre, how to light a panorama, or a picture-gallery, all in full-size models erected specially for the occasion. The Exhibition is very likely to prove a great success, and the meetings to be held in connexion with it, such as the Electro-technical Conference, the meeting of the representatives of the municipal boards of the cities of the Empire, &c., will, no doubt, aid in giving it an importance. Germany, with its Art Exhibition at Berlin and its Technical Exhibition at Frankfort, will take a prominent position in the exhibition chronicle of the year.

DR. TRISTRAM, Chancellor of the Diocese of London, last week made some important observations when giving judgment in regard to a faculty for chancel gates at St. Paul's, Camden-square. He stated that it was the practice of the Court not to grant such a faculty until it was shown

very clearly that such gates would be really useful. He further added that, as churches were now so frequently open during the daytime, these gates might in such cases be regarded as useful in order to prevent persons going into the chancel. It would therefore appear to be a rule of the Diocese of London that chancel gates will be sanctioned where there is any evidence that the church is left open, or is going to be left open, during the daytime. If chancel gates are erected, it is desirable that they should be worked in fitting material, and of good design, and as these gates are likely to increase in number, they will afford excellent opportunities for genuine art work in iron or brass.

TWO points of some interest as to the endurance of timber in contact with the ground occur in a paper on the maintenance of the permanent way of railways, read by Mr. William Greenhill before the Institution of Civil Engineers of Ireland in Dublin on Wednesday last, and of which an advance proof has been sent to us. Mr. Greenhill, in speaking of railway sleepers, says it is noticeable how the endurance of the timber is increased by being taken out of the line for a short time and then put in at some other place. The removal of the sleepers from place to place seems to be beneficial to the timber in some way, and to be conducive to its longevity. On the other hand, Mr. Greenhill says that sleepers in an idle siding decay more rapidly than those in the main line under constant traffic. He is of opinion that no steel sleeper has yet been quite successful; that timber still holds the most important place as the material for sleepers; and that when well-seasoned and protected by its envelope of creosote it is comparatively unaffected by being put into the ground.

THE Engineering and Sanitary Association is now exhibiting models illustrating some recent patents they have taken up in connexion with a new system of road-formation. A dozen 3 in. cubes of granite are attached to each other by a bituminous compound, forming a slab some 12 in. by 14 in., on the under-side of which there is a pad of bitumen, 1¼ in. thick, to deaden the sound of the traffic. These slabs would be laid on a bed of concrete in the same manner as ordinary wood pavement is at present, and connected to each other by running in bitumen between them. It can only be ascertained by actual trial whether the system possesses those qualities necessary for a good roadway, and we understand that the experiment is to be tried at Folkestone, and probably also in London. As the blocks of granite are comparatively small, the foothold for horses will be better than is afforded by the ordinary granite setts now in use, and greatly superior to asphalte. The bituminous pad will, no doubt, lessen the sound of the traffic considerably, but one of the chief advantages of the system would be that the surface, unlike that of wood pavement, is non-absorbent, a quality particularly desirable for roads in hot weather. The first cost of putting down this new roadway should not be very different from that of laying wood pavement; but as the actual cost depends on the life the slabs will have, it is impossible to say at present if it will be more economical than the systems now generally used.

DR. BRUCE LOW'S report to the Local Government Board "on some occurrences of cerebro-spinal meningitis in certain parishes of the Eastern Counties" (Suffolk, Norfolk, and one parish in Essex) is one of the rare instances in which the painstaking investigations, on which these reports are founded, have not resulted in connecting the disease with any special and preventable insanitary conditions. The disease seems to have been very serious in its results, but its appearance at this time in the districts examined is unaccounted for.

LAST week the plans for a new station at the west end of Princes-street, Edinburgh, for the Caledonian Railway, were laid before the Dean of Guild Court. The Dean said it was contended on behalf of the City that the Company were encroaching 9 ft. upon what had for upwards of seventy years been public street way. The agent for the Company, on the other hand, maintained that there was a line in the causeway distinguishing between what was the proper street way and what belonged to the Company. He added that in view of what Mr. Cunningham, C.E., the Company's engineer, said with regard to the matter, it was impossible to keep the station back a yard, as it would interfere so much with the plans. There is a large open space in front of the present station enclosed by an iron railing, but it would appear that the Company not only proposes to build over this space, but beyond it. *Interim* warrant was allowed to enable the Company to proceed with the necessary excavations, but further consideration of the disputed point was delayed for a week.

IN his letter, published in the *Times* of last Saturday, Canon Venables adverts to the fact that the Lords' Committee have passed as "unopposed" the Bill for the destruction of Cockerell's church in Regent's-street. He writes:—"Hanover Chapel is a worthy memorial of his skill,—unhappily, the only one London now possesses." But by Professor Aitchison's letter, which we printed on March 7 last, we are reminded that the London and Westminster Bank, in Lothbury (including the two seated figures, representing "London" and "Westminster"), and the,—that is, the later,—Sun Fire Office, Threadneedle-street, are Cockerell's work. The "Crown" and the "Ship" taverns stood next eastwards of the house and garden of Sir John Houblon, first Governor of the Bank of England.* The "Crown Tavern," and the original Sun Fire Insurance Office, were pulled down to make room for Sir Robert Taylor's additions (1766-86) to the Bank as first built by George Sampson, in 1734, over the site of Houblon's house. Taylor's portion includes what we believe is still known as the Rotunda (rebuilt by Soane), and the Parlour. Timbs says that the private Drawing Office (1836) and the public Drawing Office (1849) were designed by Cockerell. Sir John Soane's extensions of the Bank north and west involved the removal of the "Ship Tavern" in Bartholomew-lane, and St. Christopher-le-Stocks Church. The present Sun Fire Offices occupy the site of St. Bartholomew-by-the-Exchange Church, as rebuilt,—excepting the old tower,—by Wren. That church was pulled down in 1840, and re-erected by Cockerell in Moor-lane, by Cripplegate Without. He is said to have used much of the earlier materials; he followed, mainly, the former design, including the tower. The fourth stage of the old tower was surmounted with a heavy cornice, a parapet, and angle piers. From each face of the parapet rose, instead of a central pinnacle, a high circular-headed window or doorway, which, according to the plate, after Billings, in the late George Godwin's "Churches of London," was closed with louvres. Cockerell retained these, but left them open. Many hesitate to attribute so singular a composition to Wren; and some think that, if it is due to him, it remained as an incompleted addition to the tower. We may add that Cockerell, in conjunction with W. Wilkins, designed the enlargement of R. Jupp's (1799) second East India House, Leadenhall-street, which was pulled down some years ago for the present East India-avenue buildings. In Mr. Wyatt Papworth's edition (1881) of Joseph Gwilt's "Encyclopædia of Architecture," we find that in London the Westminster Life Office, Strand (*sic*), and the Dividend Pay Office, Bank of England, are also named as amongst his principal works.

* See a plan in the Gough Collection at the Bodleian, Oxford.

PROFESSOR FISCHER has been reading a paper before the Munich Architectural Society on the history of that almost universal architects' drawing medium, known in England as Indian Ink, though in Germany it appears to be more correctly known as Chinese Ink. The ink is credited with a venerable history, as according to a Chinese writer of the fourteenth century it was invented by one Tien-Tschen about 2,700 B.C. This ancient ink is described as having been a black varnish which was used for writing with bamboo pens on slips of silk. It is next heard of as a black stone which would dissolve in water (a little poetic licence, probably), and next as a composition obtained by burning lac and charcoal. In this form, in the third century B.C., the province of Kiangsi had a monopoly in the manfacture, and had to send a certain number of ink-sticks annually to the court as a return for the concession. The manufacture appears to have become more complicated in course of time, and the lamp-black foundation was obtained by burning various oils, firwood, bark of the pomegranate tree soaked in vinegar, and various other substances mixed in approved proportions. Inferior manufacturers were known to perfume their ink with an admixture of musk, which pleased the thoughtless purchaser but injured the practical quality of the ink, rendering it more liable to fade and to be affected by damp. The lamp-black always played the most important part in the manufacture of the ink-sticks; the adhesive matter, for the direct formation of the sticks, spoken of as a glue obtained from substances such as rhinoceros-horn, stag-horn, &c., comes next in importance. The Professor gave several prescriptions for the manufacture of the ink as it was made at different times, and explained how the different tints of blue-black, violet-black, &c., were obtained, and then went on to explain the different signs to be seen on sticks, finishing up by pointing out that the Chinese lay great stress on the mode of keeping the ink. At one time it was recommended to keep the sticks in tissue-paper, at another time in a box of ashes, and then again in lime, lately again wrapped up in leaves. If Professor Fischer had told us where to go, at the present moment, for the best ink, he would have added in practical value to his lecture. The most costly (and therefore presumably the best) Indian-ink sold in England has generally the disadvantage of being exceedingly brittle, and often the stick breaks with the mere pressure of rubbing, which is inconvenient.

LETTER FROM PARIS.

IF we compare the plan at the head of the last Salon catalogue with that which is now prepared, it will be seen that some real improvements have been made. Long galleries (taking a hint from the Salon National) are substituted this year for the numerous small rooms which were rather fatiguing to visitors. But the architectural exhibits will not gain by the change. Nothing seems to have been done by the Committee of Management to add attraction to this part of the exhibition, which is usually situated at the most deserted end of the building. Architecture will still be in exile this year, and the rooms in which it is exhibited probably only haunted by a few "professional experts." The jury of painting, which has been working incessantly under M. Bonnat, will probably have terminated its labours by the time these remarks appear. It includes, as already observed, several members of the rival Salon, an arrangement which has caused no little astonishment. Some of these, as MM. Roll, Cazin, and Mathey have had the good taste to decline, and have been replaced by MM. François Flameng, Raphael Collin and Lecomte de Noüy. The others have preferred, according to a popular phrase, "manger à deux râteliers."

At the Champ de Mars the Salon National is in the full swing of its arrangements under the intelligent guidance of M. G. Dubufe. The sculpture will occupy this year the place reserved in 1889 for foreign paintings. The partitions which divide the galleries of this part of

the building have been removed, showing the walls of the building, which are to be decorated with paintings by M. Jambon. In the place of these galleries, M. Laforcade, the chief gardener of the municipality of Paris, is to form a large garden in which the sculpture will be displayed with a top light from the glass roof, as in the Palais de l'Industrie. Two monumental fountains, by MM. Dalou and Injalbat respectively, will occupy the two extremities of this garden.

The "Artistes Independants" have inaugurated their seventh exhibition in the Ville de Paris pavilion on the Champ de Mars. This exhibition begins now to attract public notice, and though many of the works might be supposed to have come from the Asylum at Charenton, there are some admirable pictures among them, especially the collection of the works of M. Dubois Pillet, who died last year. We may notice also among other works of merit those of MM. D'Argence, d'Assignies, Pissaro, Polack, Van Rysselberghe, Valton, Rigollot, and Van Gogh.

An interesting exhibition of water-colours at the Gallery of the Volney Club should not be omitted. It includes works by MM. Allongé, F. Régamy and Lobrichon; this latter artist has a special talent for painting children, and exhibits some interesting studies from the Children's Hospital.

"*Ut pictura poesis*," says Horace, and this seems to be the motto of the promoters of a new kind of exhibition to be opened in rue St. Lazare on April 13. This is to be called the "Poil et Plume" Exhibition, and the pictures are all to be the work of eminent literary men. The proceeds are to go to the benefit of the "Orphelinat des Arts." Among the exhibitors will be MM. Meilhac de Goncourt, Sardou, Bergerat, Gille, and Madame P. Gauthier. Deceased authors will be represented by productions of Victor Hugo (whose satirical designs are well known), Théophile Gauthier, and Alfred de Vigny. The exhibition will be an original one, at all events, if nothing more.

The riches of the Parisian museums increase every day. The Louvre has just acquired various important new works, including two pictures left by Paul Delaroche. One of these is by Louis David, the portrait of Mdme. Chalgrin, the other is a fine portrait of Carle Vernet by Robert Lefèvre. The widow and daughter of Isabey, the celebrated miniature painter, have presented his portrait also to the Louvre, painted by Horace Vernet. Another acquisition is in the shape of two little panels hinged together like a book, ornamented externally with fleur-de-lys on a blue ground. On the inner face are the portraits of King René of Anjou and his Queen Jeanne d'Aval. These panels form a very rare and curious example of French painting of the fifteenth century. The Louvre has also acquired a bas-relief attributed to the Hittite nation who inhabited Palestine before the Hebrews. It represents a hunting scene, a curious bit of antique realism.

The Luxemburg has received two busts, one the work of the late sculptor Delaplanche: the other is the work of M. Falguiére, the portrait of the Baroness Daumesnil. The Cluny Museum also has received numerous gifts lately, including some sculpture, in stone, of the fifteenth and sixteenth century, faïence of Nevers of the seventeenth centuries, besides various works in ivory, wood-carving, &c. The Musée Carnavalet has lately purchased, at a cost of 60,000 francs, a collection of paintings and drawings got together by an old dealer in "curios," M. Baur, and which constitutes an interesting monography of old Paris.

The public subscription opened for the Meissonier monument has now amounted to 30,000 francs. The first intention of erecting the monument in the Tuileries gardens between the Marsan and Flore pavilions has been abandoned, as it is thought that it would be lost in the large space of the former Cour du Carrousel, and that it would be better to place it on the quai, in the space adjoining the exterior of the Louvre and known as the "Jardin de l'Infante." It will have later, as a pendant on the same site, the statue of the painter Prud'hon.

For the monument itself there have been two designs. The first represents the painter seated in the meditative attitude of the portrait which has been popularised by engraving and photography. On the steps of the pedestal is the figure of a cuirassier, standing, and at the side a seated female figure representing Art. This was the one preferred by the Committee. M. Mercié, the sculptor, however, prefers the other much more decorative design, in which Meissonier, with arms extended and holding his brushes and palette, is carried in triumph on the shoulders of a group of the soldiers whom he painted so well; a soldier of the Revolution, a grenadier of the Imperial Guard, and a "fantassin" of the present army. After some discussion, the Committee, on the advice of M. Charles Garnier, have left M. Mercié at liberty to follow his own inspiration in the matter.

The Conseil Supérieur des Beaux-Arts, which met a few days since, has had to consider various subjects raised by the Chamber of Deputies, in the course of the discussion on the Budget; more especially in regard to instruction in the national manufactories, the Academy of France at Rome, the financial maintenance and the administration of museums, and the admission of women to the course of instruction in the École des Beaux-Arts. For the consideration of these complicated and delicate questions the committee has been subdivided into four sub-committees. The first, presided over by M. Berthelot, is occupied with the manufacturers' question; the second, under the presidency of M. Jules Ferry, will discuss the museums; and M. Ferry will also preside over the committee of the Academy at Rome. The State instruction in art for women will be considered in a committee under the presidency of M. Spuller. The three chairmen have been successively Ministers of Public Instruction, and have therefore special experience in questions of this kind; the choice of M. Jules Ferry is much appreciated, on account of the services he has rendered to the cause of artistic instruction during the whole of his career as a public man.

The Minister of Public Works, who, as well as his colleague of the Beaux-Arts, is very fond of changes, has been reorganising the Direction des Bâtiments Civils, by the constitution of a superior "Committee of National Palaces," as it before existed from 1876 to 1881. Among the members of this Committee are two painters (MM. Lenepveu and Roll), two sculptors (MM. Dalou and Paul Dubois), and four of the Inspecteurs Générales des Bâtiments Civils, who of course are architects.

After the artistic schism of the last two years, are we destined to see yet a *third* Salon arise? It is to be hoped not; but it appears that a party of artists, among whom are M. Boucher the sculptor and M. Cormon the painter, are taking the initiative in starting an annual exhibition of the works of artists who have received honours at the Salon, or who have gained travelling studentships. It is even stated that this exhibition, which no one is very much in need of, is to be held in the Salle des États of the Louvre.

The candidates for the Grand Prix de Rome have commenced their sketches for entrance, at the École des Beaux-Arts. The subject is "Hamilcar making his son swear enmity to Rome."

The Jury of Architecture has decided the competition for a design for a baptismal chapel, the first prize being awarded to M. Guilbert, the second to M. Hannotère. For the Edmond Labarre prize, founded in 1880, for students of the first and second class, the jury has selected M. Recoura, pupil of M. Pascal.

The death of two sculptors of talent is announced; M. René Fache, formerly professor at the Fine Arts Academy of Valencienne and correspondent of the Institut; and M. Augustin Courtet. M. Fache, who was seventy-five years of age, was an able professor who has taught or influenced a whole generation of sculptors, among whom may be named MM. Carlier, Fagel, Gauquié, Mabille, Desruelles, &c. He was a pupil of Bra and of David d'Angers. His once eminent pupil Aimé Millet died but shortly before him. Augustin Courtet was a pupil of Pradier, Ramey *fils* and Dumont. He was born at Lyons in 1821, and gained a troisième médaille in the Salon of 1848. Many of his works decorate public monuments in Paris, especially the Church of St. Laurent and the Tour St. Jacques le Boucherie.

The Société Centrale des Architectes has lost a few days since one of its members, M. Charles Marot, who for more than thirty years was connected with the "service d'entretien" of the Louvre and the Tuileries Palace, of which he was latterly the Chief Inspector. After having studied under Duban and at the École des Beaux-Arts, he became a zealous collaborator with Visconti, Lefuel and M. Guillaume. We must mention also the death of M. François Athanase Mortier, architect to the Grande Chancellerie of the Legion of Honour, who died last Sunday at the age of eighty-three. He was commissioned in 1872 to reconstruct the Palace of the Legion of Honour, which had been burned by the Communists. He obtained the Cross of the Legion of Honour in 1877, in recompense for this work.

THE LONDON WATER QUESTION.

WE last week (p. 250) stated the position of this question before the House of Commons at the present time. We now give our promised *résumé* of the Special Report of the Parliamentary Committee of the County Council on the subject.

Apart from the Bill to be introduced by Sir John Lubbock on behalf of the County Council, it appears from the special report referred to that there have been introduced into Parliament this session three private Bills and three public Bills affecting in some way or other the London Water Question. The private Bills are (1) the London Water Commission Bill, (2) the Southwark and Vauxhall Water Bill, and (3) the Croydon Water Bill. The three public Bills are—(4) the Metropolis Water Supply Bill, (5) the London Water (Meter) Bill, and (6) the Metropolitan Water Companies (Charges) Bill.

Main Questions for Consideration.

In defining the main questions for consideration, the report of the Parliamentary Committee of the County Council says that the Bills are so interdependent that they must necessarily be considered together. The report then goes on:—

"Among the issues raised by the private Bill of the London Water Commission, promoted by the Corporation, and the public Bill of Metropolis Water Supply, promoted on behalf of vestries, there is one of primary importance, viz.:—

1. Should any new body be created—whether Trust or Commission—to whom the London water supply should be immediately entrusted?

And this question involves a second equally important, viz.:—

2. Should the London County Council be the body to deal with the water supply on behalf or the consumers?

To the first of these questions we have no hesitation in recommending a negative answer, and the same considerations which lead us to this will be found to support an affirmative answer to the second question.

As, however, it appears from the pending Bills that the first of these questions will be differently answered by bodies whose opinions are entitled to great respect (the City of London and some of the London Vestries), we think it right to explain the reason for the answer which we propose to give."

The circumstances of London are, the Council urge, the same as those of most other large towns. The question of water supply to London differs in magnitude only, not in principle, from the same question as already fully discussed and solved by the leading municipal corporations for other great centres of population in the United Kingdom.

Reports of Parliamentary Committees and other inquiries, and various local Acts of Parliament, extending over a long series of years, have, the report urges, completely recognised the principles which have been applied to provincial towns. The conclusions of Sir W. Harcourt's Committee of 1880 are quoted, as follows:—

"That the supply of water to the Metropolis should be placed under the control of some public body;

That *in the absence of any single municipal body* to which these functions could be committed, a water authority of a representative character should be constituted; and

That a Bill having that object should be introduced at an early date by the Government."

The report refers specially to this point, because it is asserted that from some printed memoranda issued in reference to the principal Bills dealt with in the County Council report, the words in italics have been omitted, and the conclusions of the Parliamentary Committee may have been misunderstood or not fully quoted; it being stated in such memoranda that a new representative body was recommended by Sir W. Harcourt's Committee, while no reference was made to the fact that that conclusion was based on the then absence of any single municipal body in the case of London to whom these functions could be committed.

It can hardly be suggested, says the report now under notice, that the London County Council is not such a municipal body as indicated in Sir W. Harcourt's report.

Some objections to the transfer of the water supply to the Council discussed.

Under this head we quote the following from the report:—

"1. It is suggested by the advocates for creating a new body that the Council is more overburdened with work than the Corporations of Manchester, Liverpool, Dublin, and other towns, and could not find time for the work. We do not think this need be feared. The administrative functions transferred in 1889 to this Council in the management of the asylums and industrial schools, the main drainage of the metropolitan area, the enforcement of the Metropolitan Building Acts, the management of the Fire Brigade, parks and open spaces, and bridges, with other numerous and important duties, have been discharged without material difficulty, and it is believed with success. It may be urged that there was transferred along with the duties a highly-trained and efficient staff of officers, to whose assistance the Council is largely indebted for such success as it has achieved. We reply that with the transfer of the water supply we shall in like manner be able to avail ourselves of officials equally versed in their various duties, who will doubtless be equally willing to aid us with their loyal co-operation. Even as at present constituted, we have no doubt that the Council is in a position to cope with the task; but experience will indicate, if it has not already indicated, means by which the work of the Council may be accomplished with less labour than at present. The work of the Council during its first years has been necessarily heavy. The experience gained, the organization and arrangements effected during this period, is simplifying, and may be expected to simplify the work in the future. Larger delegation of powers to Committees, the diminution of numbers of members serving on Committees, better distribution of work among Committees, will tend to the relief of the Council, and render it not difficult to find an influential Committee which will devote constant attention to the management of this business.

2. The peculiarity arising from the relative positions of the Corporation of the City of London and this Council.—We feel sure that all members of the Council will duly appreciate the services which the City has rendered to London in instituting inquiries into and dealing with the subject of water supply, especially during the assumed technical disability of the Council and previously of the Metropolitan Board to handle it. We recognise, moreover, the great historical position of the City as justly giving great weight to their representations on any such subject, and we have very carefully considered whether any scheme could be suggested under which some special representation could be given to the City in the management of the water supply. On the whole, however, we are unable to draw any substantial distinction between the position of the City in regard to main drainage and the position of the City in regard to water supply. If any difficulty arise or be anticipated under this head, it arises from relations already anomalous, and cannot be remedied by the introduction of a new body and additional complications.

3. The special circumstances of the towns and districts without the London County boundary, but supplied by the Metropolitan Water Companies.—On this we have only to observe that every problem involved in the relations between London and adjacent districts has been already solved by the experience of Manchester, Glasgow, and other towns.

When we come to examine the special proposals for establishing a new Trust, contained in the two pending Bills, we find that such examinations strengthen the above conclusions."

London Water Commission Bill.

Dealing first with this Bill, which is promoted by the Corporation of London, it is observed that the proposal merely involves the establishment of a Commission to be empowered to consider and submit to Parliament Bills dealing with the subject. In settling any such Bill, says the County Council report, the most important controversial questions would have to be solved by the proposed Commission—questions as to the efficiency of the present and need of future sources of supply; questions concerning the purchase of existing works; and questions concerning the proper mode of charging for water both within and without the county boundary; while there would be another class of controversial questions between the consumers of the water on the one hand, and mill-owners, riparian proprietors, sanitary and other authorities, and other persons interested in the water and watersheds of the Thames and Lea valleys on the other hand. Among these the pre-eminent questions of purchase or application to Parliament to authorise new works would demand immediate handling "by a newly-formed, heterogeneous, and unorganised body with wholly inadequate funds, in the face of opposition unanimous, organised, and with practically unlimited resources."

The proposed constitution of the Commission is analysed as follows:—

London County Council members (including the Chairman of the Council)	21
Members representing outside districts (subject to a provision for their ultimate increase, apparently, to 28)	22
Corporation of the City (including the Lord Mayor)	6
Appointed by Departments of State	2
Total	51

"Upon the questions above indicated, it may be assumed that the 21 members representing the London County Council, and the 22 members representing the outside districts, would have opposing interests, and their numbers being so nearly balanced, the members representing the Corporation would practically have the voting power upon these questions. In fact, the County Council members could not out-vote the members representing the outside district without the support of the Corporation members; while, if the number of the outside members be increased as indicated, they would have a majority of one over the London representatives. Of course, the interests of all the various outside districts represented on the Commission may be different and divergent, but it is conceived that on some of the more vital questions the outside districts would combine.

Having regard to the constitution of the proposed Commission and the manner in which the various interests proposed to be represented thereon would be balanced, even a preliminary agreement upon the general policy to be followed would be difficult of attainment.

And again, even if this difficulty were overcome, and a majority of the Commission concurred in the presentation of a Bill to Parliament, it is scarcely possible that it could be based upon anything like unanimity of opinion. Opponents would have the views of a minority,—perhaps a large minority,—to support them; and the prospects of passing a Bill in the circumstances, opposed, as it certainly would be, by one or more interests affected, would be remote. However disadvantageous to London any such Bill might be considered, either by the County Council or by any large section of the inhabitants, they would probably be precluded from opposing it, as it would have been introduced into Parliament by a Commission on which the Council was represented. Should, however, these preliminary difficulties be overcome, something like the following results might not improbably be expected:—

The object in establishing the Commission is first to secure, and second to manage, the water supply of London and outside districts.

It would be, therefore, necessary to the continued existence of the Commission that it should accomplish the first of these objects.

It can do this, subject to obtaining the necessary Parliamentary powers, by (*a*) an alternative and independent supply; (*b*) acquiring the undertakings of the companies by agreement, (1) including full settlement of all details, or (2) settlement of terms for submission to arbitration; (*c*) acquiring by arbitration on terms not accepted by the companies. They must proceed either by contentious Bills in Parliament, which would, of course, be strenuously opposed by the companies, or they must, if they adopt the alternative (*b*), proceed by negotiation, which would in its essence also be contentious. In either case they would contend on most unequal terms. The companies are united, experienced, deeply interested, well informed, and wealthy. The Commission would be discordant, unorganised, ill-informed, and ill-equipped.

It has no income except a loan of 5,000*l.* from the Corporation to meet its expenditure.

The financial obligations resting upon the Commission are the following:—(*a*) To provide and maintain a fit and convenient office for holding meetings of 51 members and transacting business. (*b*) Appoint and pay a secretary and such officers and servants as may be required. (*c*) Pay auditors of accounts. (*d*) Pay 49 nominated members. (*e*) Disburse all necessary expenditure of the office. (*f*) Make inquiry into the present and possible future sources of supply. (*g*) Promote a Bill or Bills in Parliament (if *in opposition* to water companies a most costly business). The Commission would have the strongest inducement, through lack of funds and the necessity of preserving its existence, to come to terms with the companies; it could neither afford to remain inactive nor to risk defeat in a parliamentary contest with them.

The appointment of such a Commission, unwieldy and incongruous in its composition, and unfitted to enter into negotiation and contest with the united companies, would, under the circumstances described, be virtually to place the interests of the people of London in the hands of the water companies.

The Bill by its vagueness and by relegating difficult questions to the obscurity of the future, escapes objections which would otherwise have been obvious. In this respect the second Bill is very instructive, for the Water Trust proposed by this City Bill must inevitably, when they get to work, find themselves involved in the difficulties, financial and administative, which are more fully exposed in the scheme of the second Bill to which we proceed to advert."

Metropolis Water Supply Bill.

Many of the general objections to the London Water Commission Bill will, in the opinion of the Parliamentary Committee of the County Council, equally apply to the Metropolis Water Supply Bill. But there are some special circumstances about this Bill which rendered it deserving of very close consideration by the Council. It appears that it has been prepared by the "Honorary Secretary to Executive Committee of Metropolitan Vestries and District Boards, Saint James's Vestry Hall, Piccadilly."

"The Bill starts upon the assumption that the existing water undertakings *must* be immediately purchased on arbitration terms. We think most members of the Council would hesitate, without far fuller information than we as yet possess, to commit the ratepayers of London to buy these works at whatever figure an arbitrator or board of arbitration may award, or to enter into an arbitration without Parliament having laid down any definite rules in relation to the terms and conditions affecting the purchase. There are *primâ facie* grounds for believing that the market value of the companies' stocks, as expressed by recent Stock Exchange quotations, is unduly large, being influenced by other considerations than those of intrinsic value; that unduly high dividends have been maintained, money having been disbursed by way of dividends which ought to have been applied to expenditure on matters either neglected entirely or provided out of capital; that the works and plant are in some respects obsolete; that no adequate allowance has been made for depreciation, and above all that heavy expenditure (probably long unprofitable (in the establishment of a new or supplementary system of supply is desirable and perhaps imminent.

The Council has already voted in favour of a resolution asking the Government to institute inquiries covering fresh sources of supply. If, as appears not improbable from the reports made by the officials of the Government and of the Council, it should prove that the present sources of supply are, or soon will be, inadequate,* and that great expense will have to be incurred to procure fresh sources of supply, this fact will materially diminish the value of the property which the municipality is to acquire under the arbitration. And yet, as this Bill stands, the arbitrators, in the absence of definite instructions from Parliament on the subject, would probably have neither the power nor the disposition to take this fact into consideration. They would certainly not be obliged to do so; and the arbitration might thus saddle Londoners with the price of an undertaking one-half of which would be valueless to them.

Should there be no real ground for suspecting any of the above-mentioned contingencies to exist, it would seem most inexpedient that an outside body without the experience of the Council and its predecessors,—in fact, devoid of experience on the subject,—should commit London to the result of such an arbitration.

One of the principal clauses of the Bill (6) is so drafted as to place the proposed Trust under a statutory obligation 'to carry into effect the purposes of the Act,' not only by the acquisition of the companies' undertakings, but also 'by the enlargement and improvement of their waterworks, the construction of new waterworks, and the supply of water from *new* and *independent* sources.'

It has been suggested to us that this is a mere error in drafting; but the explanatory memorandum sent us by the promoters seems to leave no room for doubt that the clause is so framed by design. It would impose on the Trustees the 'trust' not only of purchasing the whole of the existing works, but also of constructing new waterworks and supplying water from new and independent sources, a policy to which it can scarcely be conceived that the inhabitants of London ought to stand committed. It is probably no exaggeration to affirm that whereas a totally new and satisfactory series of works might be provided at an estimated cost varying from 10,000,000*l.* to 15,000,000*l.*, this extraordinary scheme might cost London, if carried out as proposed by the Bill, some indefinite sum approaching 50,000,000*l.*"

The arbitration provisions of this Bill seem to the Parliamentary Committee of the Council to be open to grave objection. Clause 13 provides that the Arbitration Board shall consist of four members, to be appointed respectively by the Local Government Board, the Institute of Bankers, the Institution of Civil Engineers, and the Surveyors' Institution. Apart from purely speculative suggestions as to the policy of these nominees, "they are expressly made arbitrators within the meaning of the Lands Clauses Acts (clause 13, sub-par 3), so that there is as it were a statutory direction, not only to award the costs of the arbitration as against the purchasers (subject to some special powers not

* On this head we may refer the readers of the *Builder* to some remarks contained in recent issues of the "Annual Report of the Local Government Board," and commented on in the *Builder* for December 1, 1888, p. 393; November 30, 1889, p. 386; and October 18, 1890, p. 306.

affecting the principle), but to make the additional allowance in respect of compulsory purchase which has become habitual under the Land Clauses Acts."

"By paragraph 14, the Arbitration Board are required to have regard to the value of the undertakings 'prior to the introduction into Parliament of the Bill.' This is probably intended to prevent the arbitrator from basing his award on any increase in the selling price of the stocks which may be brought about with a view to influence the award. But we think it is not unlikely to have another effect, which should be guarded against, and may bind the arbitrators to an award of not less than the 'market value' of the stocks prior to the introduction of the Bill. It is obvious that if half of the suggestions above made in deterioration of the value of the water undertakings have any foundation in fact, they will become matters of public notoriety, either during the progress of the Parliamentary proceedings, or after the passing the Bill into an Act (if it should pass), and although the disclosure of any such facts might reduce the saleable value of the stocks to accord with the intrinsic value of the undertakings, it is probable that this result would be excluded from the consideration of the Board of Arbitration under the terms of this section 14. We feel no doubt that the promoters and the Council would be in accord on the principle involved.

It is true that the power possessed or claimed to be possessed by any company to make up deficiencies in the dividends of previous years is stated to be abandoned, but whether any such power exists, and whether but for this enactment an arbitrator could properly take it into consideration is very doubtful."

After discussing the financial scheme of the Vestries' Bill, which is condemned as intricate and unsatisfactory, the report of the Parliamentary Committee of the County Council summarises the main objections to this Bill as follows:—"1, Multiplication and confusion of jurisdiction; 2, Unsatisfactory and extravagant finance; 3, Interference with principles of rating, and delegation to another body of a power to mortgage the rates; 4, Delegation to arbitrators of principles which should be determined by Parliament; 5, Delegation to arbitrators of too wide and vague powers; 6, Unsatisfactory character of arbitration tribunal; 7, No direction to the arbitrators, except such as will enhance price; 8, The establishment of a *new* body to carry out this enormous transaction with the Water Companies; 9, Enabling the vendors with all their accumulated experience, knowledge, and official strength to deal with purchasers entirely inexperienced and devoid of information or the sources of information essential to success."

The report then continues:—

"It is at best doubtful whether the substitution of any Commission foreign to the Council for the Companies would not have other disadvantages. The Council has now the power to criticise and oppose on petition, if necessary, Bills introduced by the water companies and to suggest legislation as to the supply of water and subjects incident thereto. But it could hardly do this in the case of Bills introduced by a Commission or a system of supply adopted by a Commission. The Council as representing the inhabitants and ratepayers has many questions to consider and deal with. Among them are:—1. The efficiency of the works for existing and future requirements. 2. The price charged. 3. The method of supply. 4. The interference with streets. 5. The destination of surplus profits arising from the water supply, all of which might involve a constant conflict between the Council and the Commission, as between the Council and the Companies.

The sole interest of a Commission, like that of the Companies, would be to show a margin of income over expenditure. Any such margin would probably be applicable in reduction of charges for water supplied. It is so expressly provided by the Metropolis Water Bill (subject to a provision as to the 'equalisation of water rents and all charges incidental thereto throughout the metropolitan water area'). In short, the Commission would be representing the consumers of water throughout the whole area of supply, whose interests are by no means identical with those of the metropolitan ratepayers, who might nevertheless be compelled to keep the commission going by making up any deficiency in income. The Commission would not be the rating authority, it would not be charged with sanitary duties or the supervision of public health, and it is conceivable that it might adopt, or seek to adopt, some system of charge or supply which would bring it into immediate conflict with the Council in its natural policy of securing for the poorer classes as large a supply of water with as little charge to them as practicable."

Second main question discussed.

This leads the Committee to the second main question proposed at the outset of their report, viz., Should the power of dealing with the London water supply be now entrusted to the Council? The Council, they point out, has already taken two important steps in this matter. It is inquiring, under powers given by an act of last year, into the question of fresh sources of supply, and it has petitioned the Government to institute an independent and authoritative inquiry on this all-important question. Every step in the investigation, says the report, "reveals the importance of caution in regard to the question of taking over the existing works and the terms on which they should be taken." It is obvious, they add from the facts stated in the Engineer's reports* that the necessity for new sources of supply will very soon be imminent. Says the Committee, in this connexion:—

"It is a matter of notoriety that the water of a river like the Thames, passing great and increasing populations, and itself the residence in the hottest months of no small population in house-boats, must be more or less polluted with sewage, excrementitious matter, and vegetable and animal refuse; and it is a necessary subject for investigation how far a water in which these ingredients prevail can be safely relied upon in the future as the only potable water accessible to the greater part of London.

It appears from more or less authoritative reports that the Thames water as supplied to London is in certain circumstances responsible for the spread of disease; that it is at least occasionally coloured, turbid, and inefficiently filtered, and the extent to which the works of particular companies are in this respect defective may have an important bearing on the expediency of purchasing them.

It follows that if the Council takes up the water supply, a demand for a new and purer water supply is sure to arise, and the Council may be forced into a very large expenditure on a new scheme."

As to the Statistics of other Towns.

The Parliamentary Agent to the Council has obtained information from most of the principal Corporations of the kingdom who are supplying water, showing in tabular form:—The area and population within their municipal limits; the area and population supplied by them without their municipal limits; the cost of the waterworks; the rates charged; and the system of supply adopted in the area outside the municipal limits.

"From the information thus obtained it would appear that if the Water Companies were to obtain in payment for their undertakings anything like the figure which they are understood to ask, and which was suggested by Mr. Smith's agreements,† the Council would start with old waterworks costing per head of population supplied a considerably larger sum than any of the other great waterworks of the country. Should it be proved that a new and independent supply, or new works, or even extensive improvements and modifications of existing works had to be undertaken, of course this sum would be largely increased. It must, however, be remembered that whereas many of these are gravitation works, a great part of the London water supply is derived from pumping; and, further, that the Northern towns have been subjected to considerable expenditure in respect of compensation water which the metropolitan companies have escaped, and consequently the accounts of the provincial Corporations and the metropolitan companies require some adjustment before accurate comparison can be obtained.

Regarded by other tests, such as the capital cost per million gallons of water supplied, the London waterworks bought at the companies' valuation would be a most costly purchase.

We think, therefore, that great caution is desirable in dealing with the matter, and that the Council should only purchase the undertakings of the Water Companies on principles directly indicated and laid down by Parliament previously to entering into any reference.

It is abundantly clear that the Water Companies have no statutory monopoly of the supply of water, that a supply amply sufficient for all the purposes of the community could be introduced from an entirely independent source at a cost of about one-half of the price demanded by the Water Companies, and that the introduction of such supply is subject to the authority of Parliament.

It must be remembered that our predecessors, the Metropolitan Board of Works, as long ago as 1878, thought such a proposal desirable, when they introduced a Bill to authorise a supply of potable water from the chalk hills, while the following passage (passed unanimously) from the report of Sir William Harcourt's Committee deserves to be most carefully borne in mind:—

'Your Committee must observe that if the contention of the Companies is well founded, the population of the metropolis and its suburbs, amounting to four millions of people, would be left at the mercy of certain trading companies, armed with the power of raising the price of one of the first necessities of life to an extent, practically, without any limit; a situation from which the Companies seem to consider there is no escape, except in the purchase of their undertakings at such a price as they may be willing to accept. If that were the only remedy, the consequences to the consumer of the improvident legislation of the past would be indeed intolerable. But *Parliament is not unequal to redress such mischiefs to the public interests.*'

The more fully the agreements of 1880 are considered the more improvident they appear, and care must be taken that in any arbitration these agreements should in no way be allowed to prejudice the question.

The Bill of the Vestries contains, it should be observed, clauses giving the London County Council power in the months of November and December, 1891, to take upon themselves the powers and duties intrusted by the earlier part of the Bill to the proposed Water Trust. But these clauses do not fit on to the rest of the Bill, and may at any time be omitted, and even if they were passed as they stand they would place the Council in a most unsatisfactory position. The Council then newly elected would have to decide with very short notice whether to undertake the duties or not. If it refused it would be open to a charge of abdicating its functions. If it accepted it would be accepting the invidious function of purchasing from the companies on terms which are, as above shown, most unfavourable to the consumers. That the Council will have to acquire such part of the property of the Companies as is valuable and efficient we do not doubt. But it must be on proper terms, not on such an arbitration as is provided for by this Bill. It must be a purchase founded on the real value of the property, not on dividends or on market values which largely depend on dividends.

If there is to be arbitration, any arbitrator assessing the price should be bound to consider, not the existing market value of the Companies' stock or dividends paid by them, but the actual intrinsic value at the present time to the inhabitants of London of the series of waterworks which they are asked to purchase.

It would seem not unfair that he should consider (and not exceed) the cost which a totally new and satisfactory source of supply might be expected to involve, and he should consider the value of potable water drawn from the existing sources under existing statutory and sanitary conditions as compared with the value of water which might be obtained from purer and more abundant sources.

It may be added that in the case of some of the companies,—the New River Company more especially,—the property includes a large extent of landed estate with houses thereon, the acquisition of which by the Council is not in any degree essential. There are, however, some properties now occupied as reservoirs or otherwise which it would probably be necessary to acquire in the first instance if the purchase were carried out, and it would be necessary for the Council to obtain powers to deal with these by sale or leasing, should the consolidation of works admit of their being dispensed with.

We have prepared a short Bill seeking powers for the Council to introduce into Parliament Bills dealing with the water question. Leave can be at once obtained to introduce this Bill if the Council is prepared to support it, and having regard to the fact that the other Bills are pending, and will, having been read a second time, be referred to a Committee, practically no additional cost will be involved by this course, as the Council must be represented before the Committee in any case."

The ultimate conclusions at which the Committee arrived and which the Council has adopted were printed in our issue for the 21st ult. (see p. 230, *ante*). The Council have adopted the report, and Sir John Lubbock has, as we have already stated, introduced the London County Council's Bill on the subject.

Of the other Bills mentioned in this report, we need only add that the Metropolis Water Companies' (Charges Bill), introduced by Mr. Causton, has for its object, as defined in the "Memorandum," the prevention of the increase of water-rates in Loddon by reason merely of an increase in the annual or rateable value, which may be unconnected with water supply, and may involve no increased consumption of water. It is proposed to declare that the rate charged in the last financial year shall not be increased because the rateable value is raised, except for some adequate reason. The London Water (Meter) Bill, introduced by Mr. Gainsford Bruce, proposes to give the water consumers of London the option of paying for water in proportion to the quantity they use; and with that view it proposes to empower them to require to be supplied by meter. The Croydon Water Bill and the Southwark and Vauxhall Water Bill are Bills for extension of works, &c.

* We hope to be able to give a summary of these reports next week.

† Under which it was proposed to buy up the London Water Companies at a cost of about 35,000,000*l*. For a full discussion of the subject at the time see the volume of the *Builder* for the first half of the year 1880, especially articles on pp. 180, 301, 593, and 750.

"THE HOUSE THAT JONATHAN BUILDS."*

If you will pardon my being briefly autobiographical, I should like to say in the first place that it is some fifteen years ago since I, with you on most occasions at my side, Mr. President, sat in this room and listened to the words more or less weighty, which fell from the lips of those potent, grave, and reverend Seignors, learned in the law of things architectural who, at such times, came to visit us. I might have prophesied then, that after the lapse of not so many years you, sir, would be the active and honoured President of this Association which in the interim has advanced with measurable strides towards that goal of distinction, utility, and esteem to which we, who knew it in its days of juvenility, looked hopefully forward. But little did I think that I myself would be standing upon this platform, a layman, talking to architects concerning subjects anent which my hearers, possibly, can teach me many valuable truths. The fact is that during the years which stretch between the present time and my active membership of this Association I have wandered far from the architectural fold, and have betaken myself to the one profession which I venture to conceive is at the same time as arduous, and, perhaps, less profitable, as that to which I formerly belonged, and in which you, gentlemen, are all, I know, one day or another, to achieve great and glorious renown. But, while I have exchanged the ruling-pen and the set-square for the quill and printer's ink, I have always retained, and to-day still take, a lively interest in my old trade. I have to thank it for one thing, at all events; and that is for a habit, early formed and never laid aside, of that constant and sub-conscious observation of the buildings with which he may be surrounded which leads an architect, or an architectural student, to be a perennial and perambulating critic of his brethren, present and past, domestic and foreign.

When I mention further, that with eyes influenced by this habit I have, for the last twelve years, been living in Yankee-land or Dixie's-land, for I may say that in both the Northern and Southern States of America I have not only lived but have actively practised the architectural profession, I think I have laid before you, I hope with not too much prolixity, such claims as I have upon your attention for the few desultory remarks to which you are about to be kind enough to listen upon the house that our cousin Jonathan is wont to build for himself. Let me say right here that the bill of fare which I offer you will contain very few solid or compactly nutritive dishes, but there are times when trifles even though not quite so light as air, are of assistance to the intellectual digestion, even if they do but create an appetite for more substantial fare. I am going to enter into no elaborate defence of American architects, as some of you may have imagined, and, so imagining, have perchance made ready and whetted the keen-edged knives of reprobation and satire, nor am I going to bombard with the heavy artillery of adverse criticism architecture as she is spoke in the United States.

The architectural history of North America will not require an extensive array of bookshelves to contain it. When the early colonists, the stolid Dutch burghers of New Amsterdam (for New York, as you will doubtless remember, was originally settled by emigrants from Holland), the sedate Puritans of the New England States (who have left their descendants of to-day, among other legacies, that Puritan conscience and hatred of frivolity which has impressed itself in a measure upon New England architecture), or the gentlemen adventurers of Virginia and Maryland, had advanced beyond the initial stage of providing for themselves mere shelters from the inclemency of the climate, they looked to the mother country naturally enough for their architectural style; but for materials, to those forests which stretched around him for so many thousand square miles, and wood remains to-day, as it was in the seventeenth and eighteenth centuries, the main reliance of the American architect and builder. Of the early works to which I refer, but few examples remain to us; but those few examples have been so well taken advantage of by the native architect, have so impressed him as being the representative of the only mitigated antiquity to which his country can lay claim, that they have modelled to no inappreciable extent American architecture of to-day. You would be surprised if you could see what good eighteenth-century work there is to be found in America. The city halls of New York and Philadelphia, and certain churches in Maryland and Pennsylvania, are models which could afford valuable hints to the most devoted and learned student of Wren and the Queen Anne architects of our own country. Nor is the old domestic work which is to be found everywhere throughout the more early settled States, such as the old manor houses along the valley of the James or the Hudson rivers, and a few of the older city houses of Boston, New York, and Philadelphia, to be despised. A quaintly free Classicism; an ingenious use of wood, where stone or brick in this country would naturally have been used; a refinement and grace of detail, carving, and moulding; mark the work of this period, which, for want of a better name, the American architects have dubbed Colonial. A term which, at least, is more comprehensive, and founded more on actual fact, than our terrible misnomer of "Queen Anne," About the beginning of the present century, however, architecture became practically a lost art on the other side of the Atlantic, and it was, in fact, not until towards the close of the Sixties that any real and healthy regeneration took place. The last score of years, however, may fairly be termed a period of Renaissance as regards domestic architecture in America. The casual tourist may not at once be impressed with this fact when he rattles through Broadway, in New York, or the broad avenues of Chicago; he sees public buildings of a deadly monotony of ugliness and inartistic brutality on every side, and, naturally enough, says to himself that "all is barren," from the Dan of the Atlantic to the Beersheba of the Pacific. It must not be forgotten, however, that architects in America, or rather those architects who can lay worthy claim to the title in its most honourable sense, find themselves absolutely debarred from any prospect of ever having under their control any Governmental work; either that undertaken by the Federal authorities or by the more local legislature of the various States. In the former case the principles of the Governmental system place all buildings, including post offices, custom houses, and so forth, in the hands of a salaried government officer in whose appointment politics, as the word is understood in America, and that to the initiative means a great deal, plays no inconsiderable part. In the latter case, even if there be no State architect or State engineer corresponding to the Government architect aforesaid, no professional man who respects himself and his calling would consent to follow out the course of wire-pulling and log-rolling necessary to secure for himself the commission of building any important edifice. Thus one sees ignorant pretentiousness and sheer ugliness flourishing wherever public funds are expended in marble and granite.

The case is very different when one turns to the city or country house of the rich man, or even to the office building, bank, or railway station erected by those monopolistic, but liberal corporations, which form the leading feature of American commercial life. The private American is an excellent client, and in this fact I think is to be found the *raison d'être* of much that is good and better than European work in the American school of to-day. He gives his architect, as a rule, a perfectly free hand, and to those of you who have suffered, or have seen others suffer, under the captious interference and pitiful niggardliness of the British client, this will appeal with peculiar force. The fact is the American is too busy, as a rule, and too business-like to bother himself about the details of his house or warehouse. He goes to an architect, so he says, because the architect knows more about building a house than he does, and he would as soon expect the architect to meddle with the fashion in which he himself deals in stocks or pork, as put his own finger into the architectural pie. On the other hand, he has a very clear idea of what he wants, and, as a general rule, he wants the very best that he can get, whatever he may pay for it. Thus in not a few cases the professional man across the Atlantic has an absolutely free hand, and, if he be gifted with artistic conscience, he does a great deal better for his client than if he were hampered and harassed by continual fidgetting and interference. When I first made up my mind to become an emigrant, my ideas as to America and American life were of the vaguest. Such conception as I had of the country and its inhabitants led me to believe that, though they were a people who knew how to make money, and somewhat ostentatiously expend it when they had so made it, they had but rudimentary notions of the fine arts, including that of architecture, and were not particularly well informed in the science of life and luxurious living. If I thought of an American house at all, I have no doubt I had a hazy notion of a mud-beplastered log-cabin, standing in the midst of a rude clearing, as representative of the country dwelling; and of a wooden shanty with four square windows and a door, as the typical town-house. You in England to-day have doubtless learnt more of America and the Americans than we knew of them ten years ago, but I assure you that my ideas were then shared by the vast majority of my fellow Englishmen. I am not sure, after all, that you have got so very far beyond that stage of ignorance even now. Since I have returned, the most extraordinary questions have been put to me as to the tenour of domestic life in America, and only the other day a worthy lady evidently thought I was chaffing her when I assured her, upon my honour as a Christian and a gentleman, that American houses in the larger towns were sometimes built of other materials than wood, and that there were some American families in which servants were kept, and in which the wives and daughters did not do all their own housework. The fact of the matter really is,—and it is a fact that, I am glad to say, is becoming appreciated over here,—that no one in the world knows how to live better than the average American. I mean the Americans of the Eastern States, be it understood, most distinctly; for I will not deny that in the far off west, the south, and the north-west, there are certain crudities and roughnesses which are apt to set cultured teeth on edge. The New Yorker and Bostonian, and, to a less marked degree, the Chicagoan also, are cosmopolites in the truest and most admirable sense of the term. They have taken something of the best from every nation of the world; a hint here, an idea there, a suggestion from somewhere else, and the result is that they are better housed, better fed, better amused, better warmed in the winter and cooled in summer, than any European or any Asiatic.

Take the ordinary house of the middle-class American and compare it with the building of the same class on this side, and I think the odds will be found to be very largely in favour of the former. It is, in the first place, if a city house, better and more conveniently planned. Domestic service is an expensive luxury in New York, the result being that everything which will reduce household work to a minimum and render friction as non-existent as possible, is a distinct pecuniary advantage and worth taking a great deal of trouble to attain. My experience has therefore been that in most American houses of the class to which I refer, the relation of the domestic offices to the living and reception rooms is much more carefully studied, with the result of a vastly greater convenience both to servants and their employers. Such little labour-saving devices as lifts, or dumb waiters, for the carrying up of dishes from the kitchen to the dining-room, or for the sending down of soiled linen and so forth, from the top of the house to the basement, are much more universal there than here. The interior arrangements of the kitchen also, compare most favourably with the domain of the London cook. The comparative advantages of English and American kitchen ranges are not for me to discuss, but there is certainly less trouble and less work connected with the latter than with the former. There is one point, at least, in which the American house compares absolutely favourably with the English, and this is as regards the heating systems employed. Americans are exposed all over their vast country to extreme variations of temperature. They have accordingly been forced in self-preservation to so construct their houses that they shall be habitable when the thermometer is in the neighbourhood of zero, and at the same time shall not be too stifling when the temperature is semi-tropical. We in England, though we may not be exposed to quite the same variation, have something of the same nature to contend with. But we do not set

* A paper by Mr. Horace Townsend. Read before the Architectural Association on the 20th ult., as mentioned by us last week

about it (or at least have not for a great many hundred years) with the same reasonableness as the American. To all intents and purposes it is practically as cold when the glass is at 32 deg. as when it is from 10 deg. or 12 deg. or even 20 deg. below that point, and yet it seems to me the average English house is built for summer alone, and as though no such thing as winter existed. Since I returned home, at the beginning of this winter, I have hardly known what it was to be warm within four walls, whether of a house, a theatre, or any other public building, unless I were standing or sitting within two feet of a blazing coal fire. Now the American goes to work to warm his house on a very different plan. It has required no very peculiar Yankee ingenuity on his part, no very serious scientific study of the question; he has simply said to himself that in order to be warm in his house he must warm the house itself, and not the separate rooms thereof only. It is this fundamental principle which makes so great a difference between one's winter comfort in the two countries. I need not dilate upon the various methods employed by the American to attain the desired end, but I should like to momentarily take up the cudgels in defence of the much-abused system of hot-air heating. The stories one hears of oppressive floods of baked, scorching air, which are supposed to form one of the horrors of Yankee life, if the tales of some returned travellers may be believed, are, in my humble opinion, sheer and undiluted nonsense. The average American house is heated, not by *baked* air, but by *warm* air. Pure, fresh, cold air is drawn into the basements, heated to any degree which may be desired, by an ingeniously constructed furnace, and discharged through tin-lined ducts into every room and every passage of the house. The cost is trifling, the system is easily regulated, is absolutely safe, requires but little attention, and esults in a degree of comfort of which you can form no idea until yon have become habituated to it. This thorough and universal heating of a house disposes to a certain extent of another problem, which seems to me as unsolved to-day in this country as it was a decade ago, though it has been one on which a vast amount of talk has been expended, and about which volumes have been written. This is the problem of effective ventilation, and, as I say, it disappears almost entirely when one has to deal with a house the air of which is throughout of one universal temperature, and which does not practically consist, as does the English house, of a series of more or less efficiently heated rooms, separated from each other by halls and passages of semi-arctic temperature. Something more of material comfort too is the result of these thoroughly heated houses. One can practically abolish doors, save for the purposes of securing privacy, and the whole ground-floor of a house may, therefore, be thrown into one, and much valuable space gained for living purposes, which in this country would be wasted on passages and hall. Most charming effects are gained in the smaller city houses of America by this means, rooms being thrown into one by the raising of a portiere or curtain, and charmingly artistic vistas being thus gained. It has also led to the practice, which is an admirable one in a country where the average building lot is never more, and frequently less, than 25 ft. in width, of placing the staircase hall in the centre of the house, with the rooms rear and front opening into it and connected by it. But the average American of moderate income does not live in a house at all. I don't mean that he camps out in a tent, or that he is altogether homeless; he lives in a flat; and I can quite understand the shudder of disgust with which this announcement will be heard by those whose notions of flat-life are gathered from that system as developed in London. A Londoner said to me the other day that in London a flat was looked upon as a luxury. If this is so, all I can say is that London ideas of luxury and my own notions of the same article are several miles apart. The London flat is a creation of the last ten years, and among the many sins for which that decade has to answer at the Last Day, it will, I am sure, be held the chief. The better class of New York flat has its disadvantages, it is true. What is there in this decidedly second-rate world of ours which has not? Take it all in all, however, it is as convenient, comfortable, and economical an abode as intelligent man has yet devised for himself. By its means the New Yorker is enabled to live in a fashionable or convenient neighbourhood in a house,—or, at all events, in a portion of a house,—built in a style comparable only to those of the richest of his fellow citizens, and he pays for it the rent which he would have to pay for a small house in an inconvenient and distant suburb. Architecturally, the apartment-houses, as they are termed in New York and the larger cities of America, are among their most admirable features. They are run up to a somewhat alarming height, it is true, for though land in New York is dear, dearer even than in London, the atmosphere is free, and of this fact the American has taken advantage. But he has not thought it necessary to build a jaundiced-looking barrack with oblong holes punched into it in place of windows as one wicked individual, at all events, has done in London, and this abnormal height is from a practical point of view a matter of little moment; for when one ascends to one's apartment in a lift or elevator, as in Yankeedom it is termed, it matters little whether one stops at the third story or the thirteenth. The average number of storys, however, does not exceed nine or ten, and it is a significant fact that the rents are very often in direct proportion to the height of the story. The same principle is carried into the apartment-house as prevails in the ordinary dwelling-house. The staircases and passages leading to the various floors are not, as seems to be the fashion in London, cold, cheerless, and wind-swept, but are warm, carpeted, and decorated, as are the halls and staircases of a private house. The typical flat, when one enters it after stepping out of the elevator, consists of an inner hallway, or passage, from which open out the various rooms; some of these derive light and air from a central shaft, but as many as possible have direct communication with sun and air. Everything is done to economise room, and I think many valuable hints would be gained by English architects from a study of the plans and specifications of these American flats. The servants, as a rule, sleep upon the top floor, access to which is gained from each flat by a private staircase in the rear; the entire flat is heated either by steam or hot water, as the case may be, and in addition to this, there are open fireplaces in all the principal rooms. From the kitchen a dumb waiter or small lift runs to the basement, and is used by tradesmen for sending up their goods, and by servants for sending down the ashes and so forth. Coal and wood are kept in the cellar, and sent up every day as required by the janitor or caretaker attached to the premises. A large refrigerator, carefully drained, is as a rule built into the butler's pantry. The woodwork is generally hard wood, and exceedingly elaborate mantels and over-mantels with mirrors and bric-a-brac shelves, and so forth, are among the permanent fixtures. Cherry and ash are the predominant varieties of wood used, though mahogany is by no means uncommon. In the newer flats the lighting is effected by means of the incandescent electric system, and this, as well as the heating, is included in the rent. Some quarter of a century ago the ordinary house in New York was what is termed a brown-stone front, and was quite as hideous and unarchitectural as anything we can offer in this country. The exteriors were all cast in one mould, and the plan was always more or less on the same line They have changed all that now, and nowhere can a more interesting variety of elevation be found than in the more newly-built districts of New York. Even the so-called speculative builder's house is pleasing to the eye, and I have in my mind a couple of short streets in the upper part of New York which I used to pass every day, and which were entirely built by one man, an ordinary building speculator. Instead of going (as I think the same man here would) to an architect, even if he went to an architect at all, and getting from him the plans of one house, to be afterwards reduplicated as often as necessary, the American got half a dozen architects, all of acknowledged position, to design for him a number of houses of somewhat similar plan, but of absolutely varying elevation. The result is a street, which in its variety of gabling and fortuitous contrast of colour and material, is as picturesque as anything one can find in the oldest quarter of one of the oldest Dutch towns. The interiors of these small houses, which are let at a moderate rental, are arranged with a care and eye to effect, and are fitted with an opulence of detail as regards the woodwork, which could only be found here in such houses as rich men built for their own occupation.

I have said the Americans are better amused than any other nation; their amusements are certainly better housed The American theatre, both before and behind the curtain, is better arranged, on the average, than any playhouse in the world. They have thrown overboard all the hampering conventionalities which are still in force here, and render the English theatre, with all its arrangements, but a servile copy of that which was good enough for our grandfathers and great-grandfathers. As regards its plan, the American theatre is so arranged that the line of sight from every seat therein to the stage is, as a rule, perfect. The fact that the entire ground floor is taken up with what we should call here the stalls renders the task of planning, and of securing adequate entrances and exits somewhat easier, it is true, than that set before the English architect; but, at the same time, no such dangerous death-traps as one finds in London would be permitted in America. The building law of New York is in most of its provisions most admirable, but no sections are more commendable than those which expressly concern the erection of theatres or other buildings intended to be used for the purposes of public entertainment. It is provided that every theatre shall have at least one front on a public highway, and that on either side of such building shall be left a clear space of not less than 8 ft. in its narrowest part, and that this space shall begin from the line of the proscenium wall and extend the whole length of the auditorium. No portion of any theatre can be used for any other purpose, while as far as possible the entire building and all it contains must be of noncombustible material and all stage woodwork scenery and so forth must be rendered noncombustible by approved means.

I hardly think I should be doing you any service by dwelling at too great length upon the purely artistic side of American architecture or of the value of the work of American architects—work you are perhaps not only more competent than myself to judge, but are probably just as well informed concerning, by means of the professional journals which so frequently contain reproductions of their prospective plans and elevations. Do not, though, be too ready, as I fear the fashion here is, to sneer at what I may euphemistically term their eccentricities. They may be vulgar at times, their straining for novelty so-called may occasionally be offensive to the judicious, but at least they are reaching out, blindly, it may be, but still honestly, towards a style of their own. That they will eventually, and perchance have even now attained their end, I sincerely believe,. That, of course, is only my personal conviction, but I feel sure you would share it had you been as I have actually been over the greater part of the North American continent and had you seen, as I have seen, the thoroughly good and artistic work which their best men are turning out. The birth of the new style begins where all former architectural styles, we may be sure, began with—domestic work so-called—the building of the house, namely. But from that it will surely pass on to the monumental, and possibly, for they are a religious people in the main, to the ecclesiastical style. As regards this last named, it must be confessed that they are at present in a very parlous state indeed, and so many miles behind the English that the latter are quite out of sight. Nothing quite so shocking or so harrowing as the American vernacular church work would be permitted here by the public authorities. Detail is the weak point of the average American architecture, but his Gothic detail amounts to a crime. Of course, they have had Richardson, whom most of you, I am sure, know by name at least, and in Richardson they can claim the greatest architectural genius the English-speaking world has seen since Wren's days. "The King can do no wrong"—and Richardson's church work was almost on a level with his secular performances, which says everything. But Richardson is dead, and, like all men of the highest genius, he was a snare and a delusion to his followers. A big man intellectually, physically, and artistically, he was of such strong and marked an individuality that his colleagues had perforce to be his imitators, and the greatest menace offered to American architecture is the influence of this departed Titan, which is responsible for the presence of swarms of little tin Richardsons on wheels,

who are flooding the country with weak imitations of Richardsonian Romanesque, marked by all the vices but giving only pale reflections of the virtues of the original. Turn, on the other hand, to their country and town houses, and in the work of such men as Stanford White, of the firm of McKim, Mead, & White, of Richard Hunt and others whom I could name, though doubtless with but little benefit to English hearers, and one finds a restrained originality, a freshness of *motif* growing to a thoroughly trained cultured perception and trained knowledge which you would not find it easy to parallel on this side of the Atlantic. In speaking of American country houses, and in comparing them with those of England, it must be remembered that the country house, as we understand it here, the permanent home, that is of our richest and most cultured classes, the centre, indeed, of the higher English social system, does not exist in America at present. Even their largest country houses, and they have some very beautiful ones, are but the summer cottages "writ large," and they are necessarily marked by the cottage-like feeling of the primal type from which they have been evolved. As to their public buildings, I have already pointed out in what respect they are hampered regarding Government and Municipal edifices; but of their offices and corporation buildings I may say that though not so prominent as their domestic work, they are at least not quite so immoral as their churches, and such examples as the new *Times* building in New York are worthy of any country. This, I may say, is one of those exaggeratedly tall buildings the condition of real estate affairs in New York,—built, as it is, on a narrow island which admits of no circumambient extension,—forces on the native architects. Disproportionate, however, as is its height to its width, it has been treated with such consummate skill, that as one looks at it this is the last thought with which one is impressed. Without entering into any detailed criticism of the modern American architectural style,—for it has, I think, nearly outgrown the stage of fashion, even if it has not fully developed into its powers,—I may say that so far as I am aware its followers are the first architects in any nation who have journeyed with the sister arts of painting, music, and literature into the realms of impressionism. I can imagine I see some of you shake your heads, as though impressionism were a demonstrable mis-nomer as applied to architects. But a little reflection surely ought to convince you that such a thing may, under certain conditions, exist, and the study of modern American architecture will lead you to the further conviction that somewhere someone has at all events got upon the track of it. Architecture of course is not to be precisely and scientifically compared with the other arts in this respect. Nick-names and badges, such as that of the term I am applying, are somewhat reprehensible and dangerous, and are often but the outward sign and symbol of intellectual ignorance, but I think one can see that an artist may so design his building that the spectator may carry away from it, when he departs, a vivid impression of one particular feature in especial, and that that feature will for ever after be so intimately associated in his mind with that building that its image, to the exclusion of other features, will primarily be called into imaginative existence by his reminiscent faculties. Perhaps it will be the entrance, perhaps the roof, or a certain bay, or a particular chimney-stack, that is thus insisted upon, not to the detriment of other features, but to their semi-oblivion, and thus we shall think of the house, if it be a house we are considering, as the house with the door, or with the chimney, or the bay, or what-not. Again, a quality alone, or even a dimension, may be the impressive note. We may simply be struck with an ideal of domesticity, or of grandeur, or of simplicity, or with the sense of loneliness, or height, or breadth; the principle is the same in both cases, and, though this is only a half-digested idea, I am inclined to think there is a truth underlying it which is at present only imperfectly comprehended even by those whose work most strikingly evinces it.

And now, gentlemen, I have taxed your patience long enough; I frankly stated when I began that what I had to say to you would possibly be of no exceeding or practical utility, but I did not set forth to you in so many words the purpose which lay back in my own mind of the somewhat inconsequential and hastily-thrown-together remarks concerning those trans-Atlantic relatives of ours who are cousins, not only in blood but also in art. This purpose was to call your attention to the fact, or, rather, to lead you to find out for yourselves the fact, that before another generation has passed America is likely to have shaken off the leading-strings of the Old World as far as regards the art architectural, and to have worked out her own salvation in this most comprehensive of all the arts. I do not speak hastily when I declare my conviction that nowhere in the world is there a more healthy revival of architecture in progress than in America.

Mr. Owen Fleming said he had very great pleasure in moving a vote of thanks to Mr. Townsend for his admirable paper,—a paper which was admirable alike in matter and in manner. No one could look at the illustrations in the American architectural publications without seeing that architecture in America, and especially domestic architecture, was making great strides. The Americans, it seemed to him, were gradually evolving a distinct and very excellent style of their own, especially in domestic architecture. American architecture might be said roughly to consist of three divisions: domestic architecture, civic architecture, and ecclesiastical architecture; and, as Mr. Townsend had said, the domestic work was certainly far and away the best. It was true that the American architects did sometimes put forth some most extraordinary detail; but, if that were excised, there remained architectural elements of such character as bade fair to become the nucleus of a distinct style. With regard to their ecclesiastical work, it was true that they sometimes did some most excruciating things; but then it should be remembered that the Americans had been cut off from the study of the best buildings of ecclesiastical architecture. In that department of their work they had necessarily had to confine their study mainly to books, and the results showed very clearly how detrimental a thing that was. It was true that all rich Americans and, he was glad to say, a large number of architectural students, now made it a duty to cross the Atlantic, and visit the monumental buildings of Europe. As a result of that, he hoped and believed that they would develop, even in ecclesiastical architecture, a style of their own founded partly upon the work of Richardson, and partly on the works of antiquity. There was one point, however, upon which he should have liked Mr. Townsend to have given them a little information,—viz., as to the enormously high buildings of New York and other cities. Did they not seriously interfere with the enjoyment of light and air and sunshine in streets?

Mr. T. E Pryce said that he had very much pleasure in seconding the vote of thanks. No one who had followed the illustrations of the American journals could fail to be aware of the way in which the Americans were, as he thought, running ahead of us in their domestic architecture. He at any rate had been conscious of that for a very long time. Of course it might be said that they had certain advantages over us in their wider choice of materials; timber being used by them to an extent which was impossible with us. He understood that the late Mr. Richardson built very largely with marble. That was a material that we could not use in this climate for our exteriors; partly, perhaps, on account of its cost and partly on account of its want of durability. But there was one material which he thought we might use much more largely externally, viz., granite. But even in our interiors we did not use the best materials at our command. Whether it was because we were too economical or too stingy, he could not say. With regard to what might be called the official or government work of the country, he regretted to say that here, also, such work was not, as a rule, entrusted to prominent architects; but was left in the hands of a government department. There was no doubt a great deal in what Mr. Townsend had said as to the importance and desirability of the whole house being equably warmed and maintained at one temperature; but whether the American plan was altogether suited to our requirements he did not know. There was no doubt that in the arrangement and appointment of their houses and residential flats, the Americans were far ahead of us; but were not their rents comparatively much higher than those which we paid?

Mr. Lanchester, in supporting the vote of thanks, said he always understood that the American was content to pay a considerably larger percentage of his income, for the purpose of being comfortably housed, than the Englishman; therefore, as a rule, the American architect had a better chance of building comfortable houses than was afforded to the English architect. As to heating, he had always understood that the American system of heating tended very much to dry the air, and had very deleterious effects upon the constitution of the people. He remembered that some years ago there came over to this country an American engineer named Leeds, who sought to introduce the American system of heating in our houses; but after a time he came to the conclusion that we ought to ventilate with cool air, and to substitute radiating coils, instead of open fireplaces, for the purpose of warming the air instead of introducing the air warmed. He (the speaker) had been told by an American gentleman that he found that it was impossible to keep ivories in his house in America; for they came to pieces owing, presumably, to the introduction of hot air into the rooms. Possibly a system of warming which would have that effect upon ivories would require to be used for some generations of Englishmen before their constitutions became adapted to it.

Mr. C. H. Brodie said that as one who had visited the States and had seen most of its large cities, he had very great pleasure in supporting the vote of thanks to Mr. Townsend. In the main he was able to cordially endorse what Mr. Townsend had said. As far as the American house was concerned it was far ahead of our English houses; and while speaking of American houses, he would most emphatically enter his protest against a remark which was made in a letter in *A. A. Notes* to the effect that American houses consisted of very little more than a series of cupboards. He must rather take exception to Mr. Townsend's remarks about the architecture of Chicago. To his mind some of the finest specimens of modern architecture were to be found in the big buildings of that city, and he alluded especially to those designed by the late Mr. J. W. Root. He was very glad indeed that another English architect had, after prolonged experience of American houses, expressed his agreement with the views which he (the speaker) had previously ventured to bring before the Association.

Mr. Moore, while supporting the vote of thanks to Mr. Townsend, said that it might possibly be true to a very large extent that we knew nothing of American architecture; but on the other hand he ventured to suggest whether it was not possible that, as Mr. Townsend had been absent from this country over ten years, he was not quite posted up in the present position of English architecture? Our knowledge of American architecture was no doubt chiefly gained from the illustrations which we saw in the American journals; but judging from them he had come to the conclusion that American architecture might be divided into two categories: the cast-iron and the rocky; the former style being used for public and commercial buildings and for town residences, and the last-named style for domestic buildings in the country. A great many of their buildings, it had struck him, were ultra-picturesque.

The Chairman (Mr. Leonard Stokes, President), in putting the vote of thanks, said he thought that Mr. Townsend's paper was calculated to set them thinking in a direction that would do them good. It was undoubted, he thought, that American architects were running away from us in the character of their domestic work, in spite of what Mr. Moore had said about their fondness for the ultra-picturesque. Mr. Townsend had very usefully warned them against the influence of a great man—of the dangers of copying a great man. Just as in America there were "little tin Richardsons on wheels," so there were in this country little tin Shaws, whether on wheels or not. Mr. Moore has suggested that possibly Mr. Townsend was not thoroughly posted up in the latest achievements of English architects. He (the Chairman) devoutly hoped he was not, for he had been spared the sight of the awful results of attempts at imitation by the little tin Shaws.

The vote of thanks having been carried by acclamation,

Mr. Townsend briefly replied, and thanked the members for the kindness with which they had received his paper. With regard to the possibilities of the ecclesiastical architecture of America, he did not think that they would

achieve anything in that direction unless they struck out in an absolutely new direction. As to the great height of buildings in New York and other American cities, there was no doubt it was very detrimental to the free circulation of air and sunshine. He had been partly instrumental in having a Bill passed by the New York State Legislature to limit the height of buildings; but after it was passed it was discovered to be unconstitutional. As to the use of marble by Richardson, it was true the Americans used a great deal of marble; but after all it was only a very fine stone, and he thought we had some stones of equal excellence in this country. He had to thank Mr. Brodie for his highly appreciative remarks in endorsement of what he had said in the paper. As to heating by hot air, he did not think that it was so deleterious to the inmates of the houses as was generally thought to be the case. The air need not be baked or scorched; if it were, it would be owing to the carelessness of the servant or stoker. As a matter of fact, heating by hot air was the only means available within a reasonable limit of expenditure, for to have a steam-boiler for every house would be found exceedingly expensive. It was true that ivories were found to crack, but he did not believe that that was due to the system of heating. He believed it was due to the climate, to the excessive dryness of the atmosphere, and he was supported in that view by his experience that if a wet sponge were kept in the same case with the ivories they would not crack. As to the comparative price of house rents in New York and London, he thought that the balance was not against New York, where the landlords were content with smaller profits, and the taxes were less than they were in London.

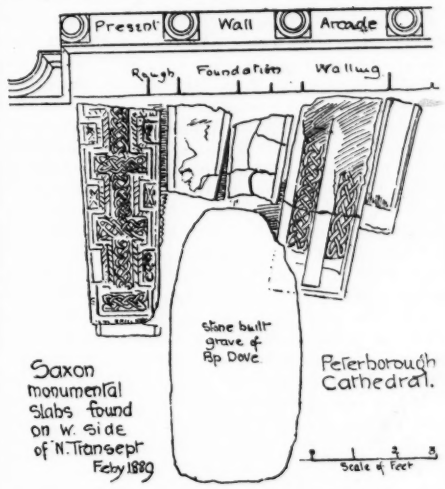
The meeting then terminated.

Illustrations.

PETERBOROUGH CATHEDRAL.*

AFTER a period extending over about seven years, the structure of Peterborough Cathedral church has now assumed its former appearance, if we are to except the absence of the four pinnacles or turrets which formerly crowned the central tower. It was during the rebuilding of this lantern, when everything in the nature of fittings was necessarily removed, and the foundations generally examined, that the traces of the early church, which we are able to show on the plan, were discovered and plotted. Whether or no these foundations are of the church which immediately preceded the great Norman building begun by Abbot John de Sais, it seems extremely probable that the relative proportions were to some extent taken as a basis for the plan of the Norman work. The dimensions of the Saxon building of which we have the foundation walls of the transepts and choir still in existence, have been approximately doubled in the Norman work, whether by accident or design. The site of the Saxon nave would occupy the space on which stand the nave cloister-walk and the south aisle of the present nave, and digging,—a matter of no great difficulty so far as the garth is concerned,—would reveal without doubt the extent westward of the early church, and determine whether or not it had aisles.

The doorway at the north-west angle of the cloister, which is inserted in a portion of a very early wall, happens to be central with the centre of the Saxon church, and may mark the west wall of the church. It is also a curious coincidence that the length of the nave, supposing it to be taken from the wall to the western piers of the Saxon central tower, is exactly half the total length of the present nave of the Cathedral. Fire, so often chronicled in the history of these establishments, destroyed the church existing at the beginning of the 12th century, and Abbot John de Sais, in March, 1117, began the erection of the Norman work, and we may reasonably suppose that, following the usual method, the work was commenced at the east. Allowing for the larger scale on which his building was designed, the idea may, in all probability, have occurred to design the new work to occupy some portion of the old site. The space, too, north and east of the first church seems to have been a burial-ground of importance, and Saxon monumental slabs have been discovered in the north transept (see plan and diagram here given). The new church would thus occupy the ground that was associated with the early history of the Abbey.


Presbt Wall Arcade
Rough Foundation Walling
Stone built grave of Ap Dove
Saxon monumental slabs found on W. side of N. Transept Feby 1889
Peterborough Cathedral.
Scale of Feet

The apsidal termination was adopted here, as in other great churches of the time, the aisles also being finished in a similar manner. One of the side apses was recently laid bare, and has been marked by a step in the south aisle (see plan).

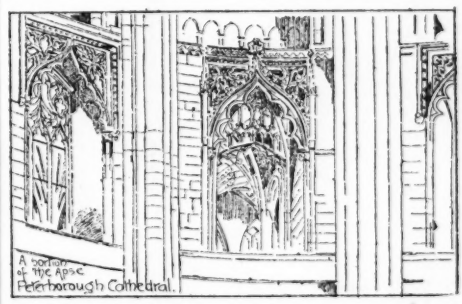
Although the design has been pretty closely adhered to throughout the long period which the remodelled church occupied in building, there are many traces in the detail, chiefly in strings and the sudden alteration or abandonment of ornament, which serve to denote that there was a stoppage from time to time in the works. It is westward of the central tower, however, that the more important changes in the structure are apparent. The second column westward of the crossing differs on plan from the first and other columns for eight bays from the central tower. It is quite possible however that this alteration in plan was either for the sake of variety (as in the Sanctuary where there are round, octagonal, and twelve-sided columns), or to mark the termination of the monastic choir westward. This purpose it now serves for the new return stalls recently put up. For six bays westward of this the columns are the same as that of the first column west of the crossing. The respond, however, of this bay is of larger dimensions, and marks the first termination westward, or more properly speaking, forms one of the piers which supported the west towers which were intended, or built. In Transitional times the nave was lengthened by two bays, and shallow western transepts were thrown out beyond the aisles north and south. Its design can be partially traced to day, but it has been considerably dovetailed into later work.

The desire for future extension was not apparently satisfied, and in the thirteenth century (its exact date is not recorded) the present western "porch" was erected. That it is unique is not to allow that it is in every sense satisfactory. However much we may admire the boldness of the conception, there is a lack of relation to what is behind it which almost causes regret that the earlier front of Transitional times, which certainly expressed its meaning better, was not spared. It is now impossible of course to say what the original Norman front was, but the design of the great arches of Peterborough recall strongly the great Norman arch of the west front at Tewkesbury Abbey, a monastery which belonged the same order—the Benedictine. An interesting point also with regard to the gradual spreading of the design may be suggested. It may reasonably be conjectured that, considering the church to be symbolical of the Cross, the base should take the form of the "Calvary," or steps. In the plan of Peterborough, it is the more apparent on account of the second projection formed by the small towers which flank the last façade; but the projecting towers, as at Wells, might well have been suggested by this endeavour to make symbolism largely enter into the design.

We have given this amount of space to the description of the Norman work, as it forms so large a portion of the existing fabric. The remaining portions of later date occur mostly eastward. As at Ely, a Lady Chapel was erected by William Paris, prior (1274-1296) parallel with the Sanctuary on the north side, and was approached from the north transept, and north ambulatory. For this purpose the outer wall was pierced (at AA on plan) the columns still remaining. In 1651 it was destroyed however, and also the cloister, and some windows from the latter were placed in the wall, which was again built up.

The remodelling of the east end of the church was the first work of Abbot Richard Aston, 1438–1496, and of Robert Kirton, who succeeded him. The Norman Apsidal terminations to the aisles were destroyed, and a rectangular building was thrown out eastward of the great apse, forming an ambulatory, and giving space for five altars against the east wall. The treatment of the external wall of the apse, to make it accord in some degree with the new work, forms a very picturesque portion of the interior.

The wall of the apse had already been pierced in Decorated times, and the very beautiful work (of which we show a portion in the subjoined



sketch) was inserted. The two side windows on the outer face of the wall (the delicate traceried work shown formed the rear-arches only) were glazed, and still retain their saddle-bars. The extension or "new work," as it is still called, rendered this unnecessary, and it not only seems to have been removed, but the three windows which occupied similar positions in the curved bays of the apse were destroyed, and perpendicular tracery inserted. The wall of the apse seems at this time to have been richly decorated with fresco consisting of heraldic shields on a diaper background, some considerable traces of which yet remain. The only other additions of importance were the central lantern, of Decorated date, and recently rebuilt from the foundations, and the chapel over a vaulted porch, which was so curiously inserted under the middle arch of the west front (see view), and which is now used as a library. But scanty remains exist of the monuments. Some effigies, including a mutilated one of Bishop John Chambers (d. 1557), and a curious tomb and effigy of Bishop Alexander, of Allwalton marble, still

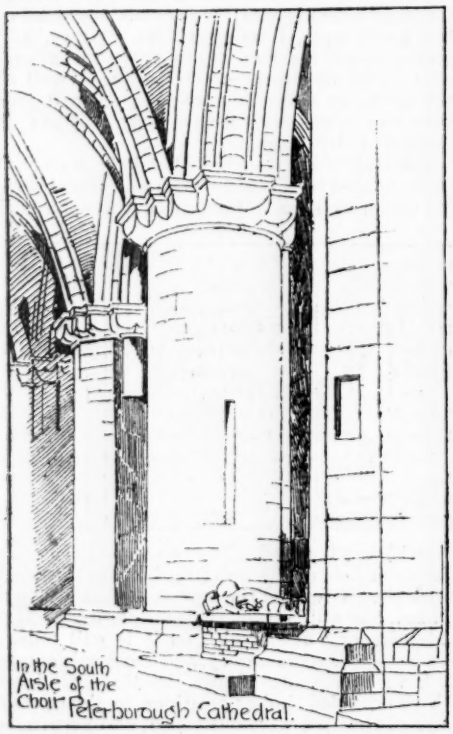
exist in the south aisle. A curious early shrine, with rude figures carved on its sides, and finishing with a coped top, has been placed in one of the recesses of the apse on the south-east. A good fragment of ironwork still remains on the door to the west aisle of the south transept (see sketch), now used as a

* We may mention here that the first of this series of illustrations of the Cathedrals of England and Wales, viz., Canterbury, appeared in the *Builder* for January 3; the second of the series, viz, Lichfield, in the number for February 7; and the third of the series, viz., St. Albans (before the alterations of recent years), in the number for March 7. The fifth of the series, viz., Wells, will appear in the *Builder* for May 2 next.

singing school, and for meetings of the chapter.

The sites are shown of the burial places of Catherine of Arragon, and Mary of Scotland, in the north and south aisles of the Presbytery respectively. Nothing, however, remains of any monument in either case.

Of the former fittings of the choir, some remains of the thirteenth-century choir stalls are to be seen in the chapel of St. James in the north transept. Parclose screens remain in the eastern chapels of both transepts, and the traces of the screens which stood between the Presbytery arches are still visible on the Norman columns (see sketch of south aisle of



In the South Aisle of the Choir Peterborough Cathedral.

Presbytery). The font, now in the south-west transept, is modern, with the exception of the bowl, which appears to be of the thirteenth century. With the exception of these few details, however, the interest of Peterborough lies almost exclusively in the early work of the main fabric. Of the abbey which adjoined it on the south, the walls of the cloister exist and some considerable remains of the infirmary standing south-east of the garth with its chapel. The cloister is apparently of fourteenth-century date, with later details inserted. The Early wall at the north-west angle with its doorway has been already referred to.

The refurnishing of the choir has been commenced. Blore's organ-screen, throne, and stalls have all been removed, and the first portion of the new stalls, designed by Mr. Pearson, are now the only permanent fittings in the choir. The steps on the plan have been shown as they at present exist, but in time further alteration will, no doubt, become necessary when a new reredos is placed in the sanctuary.

We shall give next week a few further sketches from Peterborough, by Mr. Arnold Mitchell.

OSSUARY AT THE CHURCH OF S. MILIAU, GUIMILIAU.

THE church of S. Miliau, with its famous Calvary and Ossuary, is in north-west Brittany, nine English miles south-west of Morlaix, and thirty miles east of Brest. The accompanying photo-lithograph is taken from a drawing made in the churchyard of Guimiliau. The chief and best-known attraction at Guimiliau is the magnificent Calvary, with the large figure subjects in sculpture taken from the life and passion of Christ; one of secondary interest is the south porch and Ossuary here illustrated. The Ossuary is a receptacle for human bones dug up in the churchyard in the process of grave-making, for old broken forms and boards used at interments, for broken skull-boxes and skulls, and for churchyard and church rubbish generally. At the south-west corner of the Ossuary is a holy-water stoup, and on the wall at the east is a long stone shelf furnished with small boxes or hutches (in various stages of dilapidation), each containing a human skull, minus the lower jaw. Notwithstanding the Ossuary and the skull-boxes, it is common to see numerous human bones lying about in the churchyards not only at Guimiliau, but in various other churchyards in north-west Brittany.

As to the strange practice of the preservation of skulls in boxes on stone shelves in churchyards, an old village woman at Guimiliau gave the following explanation. She said that after the dead have been buried for seven years, it is the custom of the grave-digger or sexton to re-open the grave and remove the head (minus the lower jaw) of the dead person; the sexton then cleans the head inside and out, and presents it to the nearest living relative of the deceased. The sexton, of course, gets a fee for this, and the old village woman added that many poor people nowadays had no money wherewith to pay the fee, and so were obliged to do without skulls. The relative of the dead accepts the head, pays the fee, and gets the village carpenter to enclose it in a box, which is nailed up all round, surmounted by a cross, and pierced in front with an orifice, representing a heart, a trefoil, a cross, or some other design, through which the skull can be partially seen. The hutch is painted black, inscribed with white letters, and placed on a shelf in the churchyard. The inscriptions are in French, often with the bad spelling so familiar in English, in some village churchyards in this country. The lettering is in the following style:—"Ci-Git Le Chef de Marie fse Rannou, décédée le 24 9bre, 1850, Épouse de Charles Caroff" ("Here lies the head of Marie Françoise Rannou, deceased the 24th November, 1850, wife of Charles Caroff"). Some inscriptions are shorter, as "Ici-Git Jeannet Prigent, Morte 1868." Some boxes are home-made and uninscribed. A few years' exposure to the weather soon causes the skull-boxes to fall to pieces, and the skulls then become quite exposed, and are seen to be full of vermin, such as spiders, wood-lice, and centipedes; snails also get inside the skulls to hibernate, and small wild plants grow from cracks and hollows.

The flat grave-stones in the churchyards are furnished at the foot with small depressions carved in the shape of a heart or cross, and these little depressions are kept filled with holy water. It is not uncommon to see the villagers coming from the churches with claret-bottles of holy water, from which, previous to prayer at the grave foot, they fill these little depressions. Several examples may be seen in the illustration. The figure at the back is a grave-digger; the woman in front is making woollen thread with a distaff and spindle.

The interior of the church at Guimiliau is full of pictures and gilded and painted images; there are several altars, all of the Renaissance period; at the time of our visit, garlands of flowers were hanging from pillar to pillar in the interior of the church in all directions. To students of the Renaissance, the churches of Brittany present great attractions, as the details of the architecture and ornament are elaborate, and show great study. Students of tenth, eleventh, twelfth, and thirteenth century work will find but little, although there are many vessels, ornaments, and small objects of great antiquity preserved inside of some of the churches of Brittany. W. G. S.

Dunstable.

THE BANK OF SWEDEN, STOCKHOLM.

WE gave last week the front and side elevations of this large building, in which the Legislative houses and the National Bank of Sweden are combined; we complete the illustration here by the elevation of the rear of the building, which is occupied by the bank, and plans of two floors of the latter.

The following are the references to the numbers on the plans:—

Entrance Floor of Bank.

1, 2. Bullion and Note strong-rooms.
3. Archives.
4. Reserved room.
5, 6. Bill-discounting offices.
7. Vestibule.
8. Corridor.

N.B.—The un-numbered rooms in both the Bank plans are offices of secondary importance.

Ground Floor of Bank.

1. Consulting Room.
2. Passage.
3. Hand Printing Presses.
4. Steam Printing Presses.
5. Drying-room.
6. Passage leading under the Drattninggata street to the lower floor of the Houses of Parliament, where remainder of offices are situated.

The hard and mechanical style of the elevations is not, of course, the kind of drawing we like to see in our illustration pages, but they are reproduced from lithographs from the original drawings, and the Swedish architect or draughtsman is responsible for their style. As one of the most important new buildings in a northern capital the illustration is of interest in spite of the poor style of drawing, a matter in which England is certainly in advance of the Continent.

UNIVERSITY COLLEGE LECTURES.

ON Tuesday, the 24th ult., Mr. Cecil H. Smith gave the last of his lectures in the British Museum on Greek Vases and Pottery. He spoke first of the excavations which had been carried on at the Acropolis of Athens. Among the marble understratum of the Persian sack there were found bases with four or five dedications of certain objects to Athene by painters who were clearly to be identified with the men who painted the later vases, such as Nearchos. The habit of signing the vases begins to die out about the time that the influence of the great painters, Polygnotus and others, began to be felt. These first practically raised painting to an art by itself. After 420 B.C. we have a few signatures, but these are in Southern Italy. Zenophantos appends to his signature the word Athenaios, as he worked probably near the Black Sea, but wished to let it be known that he was Athenian by origin. The great advantage we have in studying these vases from the time of Pisistratus downwards is that we obtain a long, continuous line of painting influences, at least down to Phidias and Polygnotus,—so little is otherwise known of Athenian painting. The sack of Troy, which is a representation repeated on many vases, is manifestly imitated from some original by a great artist. No trace of the drama is as yet found, the majority of subjects being Dionysiac scenes, &c., suitable for the circumstances of prosperity which marked Athens, described by Aristophanes as possessed of

"Peace, with wealth in her arms!"

Polygnotus flourished from 460–430, the best period of the red-figured style. The vase at this time was decorated with one grand composition, and as his paintings became known, their characteristics seem to have been copied on the vases. He had but a small range of colours,—probably four,—and his compositions were subjected to certain tectonic conditions. His perspective was only that of sculptural relief, and his work merely decorative. As soon as painting lost its simply decorative character, vase-painters no longer kept up with the higher art. The claim of Polygnotus to be a great painter lies in the æsthetic effect of his individual treatment of details; he was the painter of what the Greeks called 'ηθος, sculptural in idea, and possessing refined expression in the gesture. He was followed, about 420, by Apollodorus, who was marked by a knowledge of *chiaro-oscuro* and a fusion of colours, while the work of Polygnotus consisted only of simple broad washes on a white ground. Zeuxis dates from 400 B.C., and his style is described by Lucian. One work of his represents a female centaur suckling her young, while the male centaur looks on; and from a mosaic we have a clear souvenir of this painter. The vase painters had dealt formerly with gods and heroes or with daily life. A rough satyr attended on Dionysos, while the boy Eros waited on his mother Aphrodite. From the time of Zeuxis, the saytr is shown playing with the goats, while Eros is not so associated with the Goddess. It is said that Zeuxis formed his idea of Helen from the combined charms of seven or five maids of Crotona. He painted Helen at her toilet with five maidens on each side of her, and Eros flying over her head. Parrhasius seems to represent quite the opposite pole; his subjects, which are mostly gods and heroes, show him to have been under the influence of Euripides; and we know that he made designs for metal engraving vases, that those might serve as criteria for artists in the future. In the third century B.C. vases appear with a relief in the centre, and later on some whose whole decoration consists of metal and gilt. Mr. Smith next referred to white lekythi. On one of these the central scene is a mausoleum of quite Oriental style; and the palpable aim is the æsthetic beauty of the figures in the red-figured method. Soon we can trace the introduction of fresh colours and shading; vase-painting is losing its old idea of mere decorative purpose.

The Panathenaic vases referred to in a former lecture were unchanged for two centuries; on one side was Athene brandishing her spear, and the combat-scene on the other. The reason for there being no alteration here is that there was a notion that these figures were of hieratic character; and we have still the black figures on a red ground. These vases were either given away as prizes, or, as some think (and that principally because the name of the archon of the day is on many of them) kept as records of the games. On the same principle the tetrogram remained unchanged in appearance, lest the coin might not pass. Mr. Smith next spoke of the taking of Athens by Demetrius in 307, after which no vase can be definitely assigned to that city; the art passed to Italy and the Greek colonies there, chiefly Tarentum, which was the great market of the colonies; and the Tarentine style was peculiar, although based on the old Athenian vase. It had a special style of comedy—broad farcical—representation, the mode of Aristophanes having passed out of use. At Tarentum there was also a continuation of the sepulchral treatment, suggestive of the old idea of people bringing offerings to a tomb. The architectural advance also began to make itself felt. The dead person's figure was exaggerated and figures of mourners were arranged on one or two planes. The art of vase-painting seems to have either died a violent death, or expired slowly through the disturbed state of Italy during the second Punic war. The date of the fall of Capua and Tarentum seems to correspond with the end of the art.

ARCHITECTURE,—A PROFESSION OR AN ART?

IN reference to the memorial on this subject which was addressed to the President and Council of the Institute a short time since, and on which we commented in our issues of the 7th and 14th ult., pp. 184 and 203 respectively, the following correspondence has taken place:—

"Royal Institute of British Architects,
March 5, 1891.

DEAR SIR ARTHUR,—The memorial addressed by yourself and others to the President and Council of the Royal Institute of British Architects, which was received at this office on the 2nd inst., was laid before them that day, and generally considered.

In reply, we are to ask you to be so good as to arrange with the other memoralists for a conference on the terms of your memorial, for which purpose we are to suggest that a committee of your number may be appointed to meet a committee of our council.—We are, &c.,

ASTON WEBB, Hon. Secretary.
W. H. WHITE, Secretary.

Sir Arthur W. Blomfield, A.R.A."

"52, Berkeley-square, W., March 16, 1891.

DEAR SIRS,—In reference to the proposal of the Council of the Royal Institute of British Architects to hold a conference on the terms of our memorial between a committee of the Council of the Institute and a committee of the memorialists, we beg to thank the Council for their offer to meet the memorialists, but we think it desirable to define our position more precisely before accepting their invitation.

We maintain that no one is entitled to be declared an architect merely because he has answered the questions of an examiner in such subjects as admit of examination, inasmuch as, without imagination, power of design, and refinement of taste and judgment, he can have no true claim to the title; and these are qualities that cannot be brought to the test of examination. Consequently, we deprecate any attempt to make examination and diploma conditions of admission to the pursuit of architecture, because a legislative sanction would thereby be given to a false and delusive idea of the true qualifications for the art.

To prevent misunderstanding we wish to make it clear that the kind of examination to which we object is a qualifying one, carrying with it as its object a diploma or certificate, or any recognised distinction. We fully admit the value and necessity of such examinations as those made by a teacher of the work of his pupil in order to satisfy himself that his pupil has profited by his instruction.

The periodical review and correction of a student's work by his master is, of course, part of every educational system. The examinations of the Institute are not of this kind, because it does not teach, and has no students.

The point on which we differ from the Institute and Mr. Gough's committee alike is that of a qualifying examination, and its being made compulsory on those who desire to become architects.

If the Institute is so convinced of the value of a qualifying examination, and is so resolved to maintain it that they cannot entertain the idea of giving it up, we see no use in the conference to which we are invited, and can only regret their determination.

If, on the other hand, the Institute is disposed to regard the matter as still an open question, we shall be happy to confer with them.

We are, &c.,

A. W. BLOMFIELD, A.R.A.	J. T. MICKLETHWAITE.
REGINALD BLOMFIELD.	EDWARD S. PRIOR.
T. G. JACKSON.	J. D. SEDDING.
MERVYN MACARTNEY.	R. NORMAN SHAW, R.A.

REGINALD BLOMFIELD, MERVYN MACARTNEY, } Hon. Secs.
The Secretaries, R.I.B.A."

"Royal Institute of British Architects,
March 24, 1891.

Dear Sirs,—Your reply of the 16th inst., signed by Sir Arthur Blomfield and others, to our letter of the 5th inst., suggesting a conference on the terms of your memorial, was laid before the Council of the Royal Institute of British Architects yesterday, when it received from them that careful consideration which is due to the distinguished architects whose names are attached to it; and the Council can only regret that its tenor appears to render futile any discussion such as was offered by them in the conference they proposed.

We are to remind you that the Institute examinations, which qualify for candidature for membership of the Institute, are held in accordance with the provisions of a Royal Charter and of by-laws made thereunder, which have been approved by the Privy Council, and from which there is no intention to deviate even if the power to do so existed. Indeed, the Council of the Institute believe that they will best fulfil their duty to the general body of members, and most surely advance the interests of architecture throughout the British Empire, by developing the examinations, which conduce in their opinion to the educational welfare of those entering the Institute,—an object that should command the sympathy, they venture to think, of all the memorialists.—We are, &c.,

ASTON WEBB, Hon. Secretary.
WILLIAM H. WHITE, Secretary.

Reginald Blomfield, Esq., M.A., and Mervyn Macartney, Esq., B.A., 52, Berkeley-square, W."

MELROSE ABBEY.

THE following is an abstract of a lecture delivered to the Edinburgh Borderers' Union, Edinburgh, on "Border Abbeys" (Jedburgh, Kelso, Dryburgh, and Melrose), by Mr. G. S. Aitken, on the 24th ult.:—

"We now reach the last abbey in our series. So much has been written in poetry and prose about its history and architectural beauty, and so thoroughly has the artist depicted its form from many points of view, that it almost seems superfluous to add a word to what has been so well done; but as the gleaner in the harvest-field by patient industry may gather a goodly sheaf, we may perhaps find something in that glorious building that has escaped the observation of the many pilgrims who have come from far and near to examine and study this precious shrine.

The abbey that we now see is not the building founded by David I. So far as we can ascertain no vestige of the original building remains. This mysterious disappearance of an abbey coeval with the other three we have been describing is an indubitable fact, for the style of the present building is one long subsequent in time to that which prevailed at the date of original foundation. It agrees with what is known as that of the Decorated period, and happily we are furnished with two fragments of evidence which serve to throw light on our mystery. *First* we learn that at the close of the wars between Scotland and England in the fourteenth century the church and monastery of Melrose lay in ruins, and that encouraged by the state of peace secured, and aided by a grant of 2,000*l.* from King Robert I. in 1326 (said to be equal to about 50,000*l.* at the present day), they were enabled to erect the present abbey in a state of magnificence that must have far surpassed the fabric of the twelfth century.

But it will naturally be asked, how is it that no part of the original was spared? The other three Abbeys passed through the same vicissitudes, and such parts as remain in these cases are linked on to the earliest period of their history. The answer that may be accepted is that, with the large sum promised, the Melrose brotherhood had an inducement that the other houses were not fortunate enough to possess, and, while we at the present day would be very scrupulous in removing old landmarks by destroying ancient architecture, the mediæval men had no such consideration for what had been done before, if it was not elaborate enough for the advanced architecture of their time. It has been already shown that the monks did not hesitate to pull down the ancient Norman presbyteries, and replace them by ornate Decorated or Perpendicular work, and so we may conclude they acted in this spirit in the case of Melrose, removing every visible part of the early work to the foundations.

And here we find our second fragment of evidence. If the plan of the nave be examined it will be observed that the north aisle is narrower by about 3 ft. than the south aisle, but that the whole width, including aisles, is approximately the *same* as the widths of Jedburgh, Kelso, and Dryburgh, with which it no doubt originally agreed in size. Our argument is this, that the monks, like reasonable men, while they discarded the original visible work, made use of the old foundations for the new work, but, wishing to have a more splendid church, *widened* their *nave* at the expense of the north aisle, in other words removed the pillar foundation of the north aisle further north, by this simple change sparing the greater part of their old foundations, and securing a larger and more magnificent church than the first one.

Our theory is confirmed by an examination of the north and south transepts, which are exactly the same width, within a few inches, as those of the other three abbeys, and, therefore, narrower than the new nave, which they crossed. The result is a crossing of an *oblong* form that also affected the tower above, which would be thus so far off the square. We may be sure this would not have been done if the monks had been building *de novo* independent of old foundations."

ARCHITECTURAL SOCIETIES.

THE ARCHITECTURAL ASSOCIATION (LONDON).—At a meeting of the Advanced Class of Construction and Practice, held on the 25th ult., Mr. W. Henry White read a paper upon "Technical School Planning." Mr. J. M. Brydon was the special Visitor for the evening, and drawings were kindly lent by Messrs. Alfred Waterhouse, R.A.; E. C. Robins, F.S.A.; and Messrs. Smith, Woodhouse, & Willoughby, of Manchester.

MANCHESTER ARCHITECTURAL ASSOCIATION.—A special general meeting of this Association was held at the Diocesan-buildings, on Tuesday last, for a discussion on the best means of preventing the effects of frost on plumbers' work, to which several of the leading plumbers of Manchester were invited. Mr. T. Chadwick, President, occupied the chair, and opened the discussion, which was continued by Messrs. Hodgson, Woodhouse, Cook, and other members. Mr. W. Jaffrey, plumber, and Mr. M. Ingram, engineer, replied to a number of points raised, and contributed some very valuable information. It was strongly recommended that all boilers should have safety-valves, and be fitted with a scouring or cleansing pipe, by which all pipes, boiler, and cylinder could be emptied when necessary. All pipes should be protected from the cold, and the overflows from cisterns which admit cold air, and cause the ball-cocks to freeze very soon, should be protected, or directed inside instead of out. The supply-cistern should be placed in a properly-prepared room, protected from the extremes of heat and cold, well-lighted, and easy of access, and not, as is often the case, in the roof.

EMIGRATION.—The April circulars and the new editions of the penny and other handbooks, with maps, issued to-day by the Emigrants' Information Office show the present prospects of emigration to the Colonies. A summary is hung up in every post-office in England, Ireland, and Scotland, so that intending emigrants have no difficulty in obtaining information. It is important to note that this is the best month in the year for emigrants to go to Canada, where, besides the usual demand for female servants, there is now a demand for farm hands and for men in the building trades, which is likely to continue during spring and summer. The Canadian Government now offers for the first time bonuses of 15 dols. to the head of a family, and half that amount to his wife and grown-up children, if he settles on land in the north-west or in British Columbia. In Australasia the harvest is now over, but there is still a demand for female servants, miners, navvies, farm hands, dairymen, ploughmen, bushmen, general labourers, and men who understand pruning fruit trees and nursery work. Such men and women will, under certain conditions, get free or reduced passages to Queensland and Western Australia. In South Africa, carpenters, masons, bricklayers, and other useful mechanics, navvies, and female servants are in demand, and may, under certain conditions, obtain reduced passages to Cape Colony and Natal.

COMPETITIONS.

PROPOSED NEW BANKING PREMISES AT WHITBY.—The present banking premises of the York City and County Banking Company, Limited, at Whitby, being found too small, the directors have purchased a site in Baxtergate, near the centre of the town, and have selected the design of Messrs. Demaine & Brierley, architects, York, and Westminster, submitted in competition with two other firms of architects, for new premises.

BOARD SCHOOL, PAISLEY.—The *Glasgow Herald* reports that at a meeting of the Paisley School Board on the 25th ult., Mr. T. Glen Coats presiding, the report of Mr. John Gordon, I.A., Glasgow, who had been asked by the Board to act as their arbiter on the plans sent in for the new public elementary school, was opened. It was found that Mr. Gordon had placed in the order given the plans having the following mottoes:—1st, "Streams of light from wall to wall," by Mr. T. L. Watson, Glasgow; 2nd, "A B C," by Mr. Henry Higgins, jun., Glasgow; 3rd, "W," by Mr. Robert A. Bryden, Glasgow. After considering Mr. Gordon's report, and examining the plans, the Board decided to accept Mr. Watson's plans, and to appoint him architect for their new school. It was also decided to give the premium of 25*l.* to Mr. Higgins, and the premium of 15*l.* to Mr. Bryden. There were altogether fourteen sets of plans sent in by architects in Paisley and Glasgow. The school, which is to accommodate 1,100 children, and will probably cost 10,000*l.*, is to be erected at the East-lane, Williamsburgh.

Books.

Ventilation: a text-book to the practice of the art of ventilating buildings, with a supplementary chapter on air-testing. By WILLIAM PATON BUCHAN, R.P. London: Crosby Lockwood & Son. 1891.

THE key-note of this book is to be found in the following sentence:—"The author has made many tests with numerous ventilators, but as yet has not come across one which beats his own one." In common, however, with several other tradesmen who have added to architectural literature what they are pleased to call text-books, but of which the principal text is, "Buy my wares," Mr. Buchan has given us much information, which, if not very new, is, at any rate, for the most part true, and has pointed out clearly and distinctly some of the most important of the vital principles of ventilation.

Mr. Buchan's "leading line" appears to be his "patent exhaust induced-current fixed ventilator," and the scope of his book, therefore, extends very little beyond the domain to which the use of such an apparatus is suitable, but the application of such apparatus and its concomitant requirements are adequately described, and thoroughly illustrated by diagrams of the various articles Mr. Buchan has for sale.

It is but fair to Mr. Buchan to say that amongst fixed ventilators producing an exhaust action by the utilisation of wind power "his own one" may certainly, with justice, claim a high place, both for logical and scientific design, and for efficiency of action. We are pleased to note also that Mr. Buchan admits, what many makers of such apparatus have in the past denied, that a "suck down" may and does occur with their use, and that the occasional down draught from them therefore requires to be provided against. This Mr. Buchan does by his "patent self-acting anti-down-draught and inspection valve-box."

In his first chapter, the author gives us once again the well-known facts of the composition of the atmosphere, its weight, and the causes and effect of the addition of an abnormal amount of carbonic acid. He also, very rightly, describes the diffusion of gases, and points out its important influence on the practical aspect of ventilation.

The author then proceeds to deal with the question of organic impurities in vitiated air, quoting numerous authorities, and emphasising the fact that, although the carbonic acid may be a convenient measure of impurity, it is the organic matter that is the most injurious component of foul air.

The chapter on "Gases and Germs," or rather on Biogenesis and Abiogenesis, is not of much value in respect to ventilation, but one can forgive a shrewd tradesman for thinking that a little scientific gas may help to buoy up a practical man's reputation.

We now come to some valuable chapters in the book, wherein Mr. Buchan points out some of the mistakes which have been made in the past in the arrangement of ventilating apparatus, chiefly in the matter of admitting cold fresh air at the top of an apartment. We regret, however, that Mr. Buchan should sully a good cause by some would-be humorous passages which are in the worst possible taste.

After pointing out the faults of bad arrangements, the author naturally proceeds to describe what he considers improved systems, dealing separately with inlets and outlets. The subject of inlets is well treated, as far as regards inlets suited to an exhaust system of ventilation, but there is one great difficulty in connexion with such a system as Mr. Buchan's with which he does not appear to have successfully grappled, and that is, the regulation of the temperature of the incoming air. As is imperatively necessary for a system of fluctuating activity dependent upon the velocity of the wind, he provides valves for the regulation of the amount of the air current, but the temperature of the external atmosphere will vary on different days, so that if the heating pipes he shows are adequate to warm the incoming air one day, they will be inadequate on another. This is a difficulty that can be obviated in a more satisfactory manner than by shutting off part of the fresh air supply, but how it is to be done does not appear in Mr. Buchan's work. This is the chief difficulty in the application of such a system as Mr. Buchan's, and unless it is overcome we cannot be in possession of the desideratum, which he thus rightly describes:—"The aim of good inlet ventilation may be summed up in a sentence, viz., a large or requisite amount of fresh air, to be admitted slowly, and of a temperature and in a manner so as to be both comfortable and safe, and, therefore, hygienic."

Mr. Buchan's description of improved outlets is an account of various ways in which different forms of "his own one" ventilator may be used, the efficiency of which would in many cases be greater if his ducts were more scientifically arranged.

In speaking of experiments with cowls, Mr. Buchan naturally sides with Mr. Hellyer against the famous "Kew tests." We therefore have to weigh the evidence of Messrs. Buchan and Hellyer, who have cowls to sell, against that of men like Eassie, Rogers Field, and Douglas Galton. There is surely a mistake in the statement that a "12 in. Boyle's ventilator drew up 37,558 linear feet a minute." That is a velocity of over 400 miles an hour!

The author's calculating formula is simply a rather indefinite rule of thumb for selecting the size of his own ventilator for any particular job.

Artificial or mechanical ventilation is dismissed in one not very long chapter, chiefly based on the late Professor Carnelley's Report to the Dundee School Board.

A chapter on the ventilation of drains is introduced to afford an opportunity of writing about "Buchan's traps."

The last chapter in the book is very refreshing and interesting. For it Mr. Buchan is indebted to Mr. John Foggie, F.C.S., and in it is well and clearly described the method of analysing and testing the purity of air as pursued by the late Professor Carnelley.

The Design of Structures, Bridges, Roofs, &c. By S. ANGLIN. London: Charles Griffin & Co. 1891.

THE author of the above work has certainly succeeded in producing a text-book on the design of structures, which not only treats the different branches of the subject from a thoroughly practical point of view, but one which requires on the part of the reader only an elementary knowledge of mathematics. Throughout the work will be found a large number of examples, such as occur in the everyday practice of the engineer, all of which are fully worked out, many being solved both analytically and graphically.

In the early chapters of the book, the difference which should be observed between the words "stress and strain" is pointed out, and the meaning of elasticity and fatigue of materials explained. Attention is drawn to the experiments of Wöhler to determine the effects of varying and oft-repeated stresses, and it is shown that the factor of safety depends on the kind of load, as well as on the nature of the material. The properties of the chief materials used in structures such as timber, cast and wrought iron, and mild steel, are described, and such tests are given that will insure these materials being of suitable quality for the purpose to which they are applied.

A large portion of the work is devoted to describing the methods of working out stresses in all kinds of structures, from simple cantilevers to arches and continuous girders, but this subject has been so often and ably treated before that it is difficult to say anything very original concerning it. The student should, however, derive great assistance from the large number of practical cases which the author has carefully worked out to illustrate the methods adopted.

Sketches of Architectural Antiquities. By VINCENT W. VOISEY F.R.I.B.A. Eighty-two illustrations by a permanent process of photography. Bristol: James Fawn & Son. 1890.

THIS is an album of architectural sketches and measured drawings, reduced by photography from the originals. They show a great deal of industry on the part of the author, but perhaps would have been more useful for reference if they had not been reduced to quite so small a scale. The compensating advantage is that a great number and variety of subjects are got into a comparatively small album. The line drawings form the best portion of the work; the washed drawings appear to have been rather too loaded in working to reproduce well, and are consequently rather black and deficient in clearness. The sketches, we learn from the preface, were all made and completed on the spot, and not intended for publication. "They are freely interspersed with notes, details, sections of mouldings, and other things which may be of interest to architects, archæologists, and others." The measured drawings are the really useful part of the collection. The author seems to have been aiming at a collection which might appeal to the unlearned as well as to architects. This is seldom satisfactory, and results in a rather heterogeneous collection of by no means equal value. Some very interesting pieces of old metal work are included. Among the measured drawings are a good set of Yatton Church, Somersetshire, which occupies sixteen plates, and would form the making of a good monograph on the church if produced to a larger scale. An elevation of one bay of Whitby Abbey, with a number of mouldings, forms another good page, also a geometrical drawing and a perspective view of the west front of Tewkesbury, with a section of the mouldings of the grand Norman arch; the whole is very correctly given. If the author had included more work of this kind there would have been a much more serious value in his sketch-book. As it is, the bulk of it is of the kind which does very well to lie on a drawing-room table as an ornamental book for visitors to turn over. In that light it is attractive, but it is hardly the kind of book which it is worth while for an architect to publish. The author has it in him to do something of more value than this.

Transactions of The Guild and School of Art Handicraft. Vol. I., 1890.

THIS volume of transactions, issued by "*The* Guild and School of Handicraft" in Commercial-street, Whitechapel (why it claims to assume the definite article we know not), is a type of the "æsthetic" literary production. It is covered with a wrapper of grocers' sugar paper, projecting an inch or two beyond the edges of the pages, which of course are left ragged and uncut. The printed page is filled up, wherever there would otherwise be a portion of a line blank, with rows of large and prominent black ornaments, which by no means beautify the page. If spaces in a page are to be filled up decoratively, it should be done with more delicate and less obtrusive and spotty work than this. In fact, however, the spaces left between paragraphs are better left blank, for the convenience of the reader, which is surely the first thing to be considered. They form a natural and immediately obvious index to the literary arrangement of the matter.

The contents of the book consist of reports of lectures given by Mr. Tadema, Mr. Richmond, Mr. Stirling Lee, Mr. E. P. Warren (on "Parlour Architecture") and others, containing much good reading and sensible advice, which would be just as useful and less irritating to read if it were not printed in so *outré* a fashion. The marginal notes, "Here the students gathered round the table" &c. may be interesting

records to the members of "*the* Guild," but hardly to any one else. But the whole style of the issue is redolent of affectation.

Memorials of Edinburgh in the Olden Time. By Sir D. Wilson. Edinburgh and London: A. & C. Black. 1891.

We have received Parts 3, 4, and 5 of this work which continues the sketch of events in the political and social history of Edinburgh, accompanied by illustrations of corners of old Edinburgh, which are of interest as representing what has mostly disappeared or been altered past recognition. The latter portion of Part 4 is marked "Part II.," which we presume means Vol. II., and which treats of "Local Antiquities and Traditions" commencing with "the Castle," of which however the account is rather meagre.

The Trigonometry of One Angle. By the Rev. J. B. Lock, M.A. London: Macmillan & Co. 1891.

There are many students who have not sufficient leisure to study a comprehensive treatise on trigonometry, but who should be able to find time to obtain an elementary knowledge of the subject, such as is given in the above little book, which would enable them to read works on mechanics and many other similar sciences, to thoroughly understand which it is necessary to be acquainted with the properties of "sines and cosines." The author treats his subject in the same simple and complete manner that has caused his many other text-books to be so highly appreciated both by teacher and pupil, consequently there is very little difficulty in mastering the rudiments of a branch of mathematics which is of great practical value to those engaged in the architectural and engineering professions.

TRADE CATALOGUES.

Messrs. Richard Moreland & Son, engineers, of Old-street, St. Luke's, have issued a very useful and well-got-up illustrated catalogue of constructional work in steel, wrought-iron, and cast-iron. It contains sections, dimensions, weights, and strengths of rivetted steel and iron girders, roofs, columns, and stanchions, fire-proof doors, flooring, &c. A useful feature in this catalogue is the provision of a number of blank leaves at the end for sketches or memoranda, calculations, &c.

Messrs. J. Sagar & Co., saw-mill engineers, of Halifax, Yorks, send us two small catalogues of wood-working machinery, containing illustrations of many compact and ingenious machines, suitable for large or small workshops, or for use on works in progress.

The St. Pancras Ironwork Company, of St. Pancras-road, have issued an illustrated catalogue of pavement and floor lights, stall-boards, cellar-flaps, coal-hole plates, &c.

Messrs. Longden & Co., of the Phœnix Foundry, Sheffield, have sent a small descriptive pamphlet of their "Sunbeam" steam and hot-water radiators for warming buildings. These radiators are made on Mr. Leeds's patent, and appear to be well worth the attention of architects.

Mr. Frederick Betts, of York-street, London-road, Southwark, sends us a comprehensive catalogue of builders' ironmongery and hardware, including stoves, grates, and ranges of all kinds, mantels and over-mantels, railings, hinges, sanitary fittings, locks, door furniture, &c. It is very fully illustrated and is well printed and got-up.

Messrs. G. B. Kent & Sons, of Great Marlborough-street, have issued their "Painting-Brush List" for March, 1891. It includes brushes and tools of all kinds required by the painter and decorator. The productions of this house, which was established as far back as 1777,—or 114 years ago,—have long been known in the trade for their excellence.

Mr. Charles Carr, of the "Woodlands" Bell and Brass Foundry, Smethwick, sends his "Bell Catalogue" for 1891, which contains descriptions and illustrations of church, school, and factory bells, fire-alarms, &c. The catalogue also contains illustrations of brass-founders' crucibles, moulding-tools, plumbers' brasswork, &c., and will be found useful for reference.

Harrow.—The *English Illustrated Magazine* for April contains an article on Harrow School, contributed jointly by Dr. Butler, Mr. Percy M. Thornton, and Mr. P. H. Martineau, with illustrative sketches by Mr. C. T. Watson. The sketches are rather slight, and hardly do justice to the buildings represented.

Correspondence.

To the Editor of The Builder.

BYZANTINE ARCHITECTURE.

Sir,—Mr. Ferguson [see his letter, p. 233, *ante*] doubts the accuracy of my use of the word "rubble" for the filling in of Roman walls, and I think it would have been more prudent to have defined the sense in which I used it. At the time of writing, no other word occurred to me that would distinguish it from concrete, in the present acceptation of the word. Concrete now means some hard substance or substances of graduated sizes thoroughly mixed, wet or dry, with some cementing material, and then thrown into trenches or filled in between boards or walls. Some years ago, tesseræ, small triangles, and squares of pottery, intended for mosaic, but for which there was no demand, were used for this purpose, and were mixed with lime or cement and sand. Supposing a bed of concrete formed in this way were cut through, the pieces of pottery would be found lying at every conceivable angle, and an intelligent observer would come to the conclusion that the mixture, when soft, was thrown in; but, as far as I have observed, Roman filling was never like this, but always in courses more or less horizontal. As I had not much time, when I was last in Rome, to bestow on this investigation, I asked Il Cavaliere Bongioanini to give me his experience, and he said, "it was always 'coursed.'" Now let us see what M. Choisy says in his "Art of Building Among the Romans." After speaking of rammed concrete, in which pieces of stone are found with the most varied orientation, he says (p. 18), "The ordinary masonry, on the contrary, has none of this irregularity; it is a very uniform super-position of courses of mortar from 3 to 4 centimètres at the most, which alternate with courses of broken stone. All the fragments are laid flat and on their quarry bed, and if occasionally some bricks or broken pottery are employed instead of stone chips, the orientation of their faces following the horizontal course always shows itself in complete evidence. A widely-spread opinion consists in seeing in this common masonry a sort of concrete,—*i.e.*, a mixture prepared beforehand and employed by the running of stone chips and mortar; but the invariable orientation of the fragments of stone, which always turn their longest dimension horizontally, excludes, I think, this supposition."

It would not be fair to trespass on your kindness by more long extracts, but M. Choisy gives another reason for his conclusion, that the Romans did not care to incur the expense of a preliminary mixing, and showed their admirable organisation by keeping one gang of labourers to shovel on the mortar on which another gang laid the course of stone chips or brick-bats. I am inclined to believe that Vitruvius speaks of this method in his description of the filling in between walls (Lib. 2, cap. 8, para 4. Edit. Leipsig, 1869).

I came to the conclusion that the facing of triangular bricks was to serve the purpose that boards now serve in forming concrete walls above ground, *i.e.*, that it held up the soft mass of filling to a certain height without bulging, and that just before the height was reached at which the bricklayers' experience told them the walls would bulge, a course of whole bricks was carried through the wall. We know that when the Romans built walls of this rubble in trenches, the work was rammed with wooden rammers shod with iron (Vit., lib. 8, cap 6, para 14), but the mere fact of the brick-bats or stone-chips being level in ordinary walls above ground seems to preclude the idea of their being rammed.

There are two distinct methods of constructing vaults shown in M. Choisy's work, that in which a net-work of bricks on edge was used, and that in which there was a skin of flat bricks, although in this last system brick ribs were often employed as well at fixed distances, and for groin points.

When a student in Italy I once saw a room being vaulted by means of a flat brick skin, about 1½ in. thick; it was a room probably of 30 ft. by 18 ft., for I have lost my sketch, Narrow wood turning pieces were used, about 6 ft. apart. The two bricklayers began with a brick on a turning piece, and each brick was jointed in plaster of Paris, and so great was the confidence of the bricklayers, that they knelt on this skin, just set, to continue the vault; the spandrels were strengthened by small arches the reverse way, and the men told me that the whole would be filled up level with concrete, and a rammed mosaic floor be put on the top. The work was called "a la volterrana."

We are greatly indebted to Professor Middleton, Professor Baldwin Brown, Messrs. Chipiez, Perot, and Dieulafoy for all their interesting and important discoveries, but I think we should not withhold our praise and admiration from M. Choisy, the original discoverer of Roman and Byzantine methods of construction, whose first labours were mentioned by Viollet le Duc, in his Voûte article in 1868 ("Dictionnaire Raisonné"). As far as I know, no one ever dreamt of these methods before him.

G. Aitchison.

The Student's Column.

VENTILATION AND WARMING.—XIII.

ARTIFICIAL VENTILATION.

Before illustrating the use of the formulæ we have been investigating, it will be well to give some attention to the principles of artificial ventilation, to which, as well as to natural ventilation, our formulæ are applicable.

By artificial ventilation is meant, as already mentioned, that form of ventilation in which movement of the air is produced by the consumption of mechanical power or artificial energy.

The means by which artificial energy is developed for the purpose of artificial ventilation are many and varied, while their application admits of a still greater diversity of treatment.

The apparatus employed may be classed under four heads—heat, fans, pumps, and jets. These may be arranged in two ways, either for the purpose of extraction or for that of propulsion, and these may, of course, be used either separately or in conjunction with each other.

The former of these methods was and still sometimes is called the "vacuum" method, on the supposition that, by the extraction of the foul or vitiated air, a partial vacuum is produced and that the traditional abhorrence of nature for such a condition caused the inrush of fresh air to fill the vacuum. Similarly the method by propulsion was called the "plenum" method, because by the forcing in of fresh air, the space was assumed to become more full.

Each of these methods has its advantages and its disadvantages. The chief advantage of the extraction or vacuum method is that it can usually be so applied as to minimise the cost of any particular scheme of ventilation, and the naturally high temperature of vitiated air can be utilised to assist the ventilation. Its great disadvantage is that the fresh-air inlets being not under complete control, draught is very liable to occur when this method alone is adopted; indeed, in this respect artificial ventilation by extraction stands on a level with natural ventilation, which, as we have already seen, is especially prone to this evil.

With the propulsion or plenum method, the inlets are completely under control if properly arranged, and it is accordingly easy to regulate the air currents to such temperature and velocity as shall escape the probability of draught. The outlets are in this case, however, not under absolute and complete control, and occasionally trouble may arise from this source, though with far less probability than in the case of the inlets in an extraction system.

There can be no doubt that for a thoroughly reliable and easily controlled system of ventilation, a combination of the two methods must be resorted to. The fresh air must be propelled into the apartment, and the foul air extracted, both by artificial means.

Of the various apparatus employed to produce movement of the air in artificial ventilation, the oldest are applications of heated columns of air. This heated column of air may be produced by a variety of means, by furnaces, gas-burners, steam-coils, or hot water. As the efficiency of any heated column of air is, as we have seen, dependent upon the difference between its temperature and that of the external atmosphere, it is evident that without elaborate arrangements for raising or lowering the temperature of the heated air column, and constant supervision and attendance, the action of such an apparatus must be fitful and irregular. With furnaces it is almost impossible to accurately regulate the temperature of the heated air column, and with the other appliances it is always more or less difficult. Irregularity of action is therefore usually the great dis-

advantage of ventilation by heated columns of air. Such systems are also apt to be costly when applied to any large scheme, though they are sometimes advisable for small operations, and especially as an adjunct to an application of natural ventilation. As a general rule, also, these systems are only available for ventilation by extraction, or in conjunction with the method of propulsion.

Fans are probably the most useful and the most powerful means of producing artificial movement of the air we have at our command. Their variety of form is extremely great. It has been stated, and the statement is probably not beyond the truth, that over 6,000 different forms of fans have been made and used for ventilation. The primary data required for the design of a fan are the amount of air to be moved, the pressure at which it is to be delivered, and the rapidity of action of the fan. Some fans are designed to deliver a large quantity of air at low velocity, others a small quantity at high pressure, and so on. Some are more particularly suitable for extraction, others for propulsion, some for use with a considerable length of ducts, others only where the ducts are short. So considerable a subject will therefore require to be treated in a separate chapter.

Fans may be driven in a variety of ways,—by steam-engines, by wind, by water-power, or by electric motors. They may be placed near the point of entry or extraction of the air or in a central situation. The determination of the actual arrangement will therefore be dependent on the circumstances of each particular case. What is admirable in one instance may prove quite the opposite in another. Judgment and consideration are therefore of the highest importance in the use of fans, in order that the best form, the most suitable situation, and the most economical method of driving for any particular case may be ascertained and employed.

Pumps for forcing in fresh air, or for extracting foul may be used as ventilating agents, and have been so utilised in the ventilation of mines, especially on the continent. For the ventilation of buildings they are hardly so suitable, and, practically speaking, are seldom employed.

Jets for producing air currents are of three kinds; steam, compressed air, and water. Their efficiency depends principally upon the degree of pressure at which the jet issues from the nozzle, while the form of this jet should be designed with reference to the space in which it acts, so as to produce the maximum of effect by a conical or fan-like form of the expanding fluid, suitable to the space in which it develops. All these jets are apt to be noisy in action, though those of compressed air are less so than the others. They are more generally employed as means of extraction than of propulsion, although they can be employed for either purpose, the water and steam jets being, however, subject to the disadvantage, when used to force in fresh air, that the air is moistened to a considerable extent. This may, of course, in certain cases, be an advantage instead of a disadvantage, but, as a general rule, for English practice, it means increased expenditure of heating power.

With the powerful means at our disposal for producing air currents, it will be readily understood that artificial ventilation, in some form or other, is the only satisfactory method of ventilating.

We can arrange for complete and immediate control of the amount of the fresh air supplied, its temperature, and its degree of moisture.

We can also cause our air currents to take any direction we please; indeed, many buildings have been ventilated by a downward current, the fresh air being brought in at the top of the apartment, and the foul air extracted at a lower level. This cannot be recommended for general adoption, as the lower strata of the atmosphere, in which the inmates are living and breathing, must of necessity be the most impure of all the air in the room, instead of being the least vitiated as it should be. With artificial lighting, the electric light excepted, the evil would be intensified to an almost unbearable degree in the majority of instances. In any application of natural ventilation, or with a small extent of air change, such a method is certainly always to be avoided.

THE PROPOSED NEW POLICE BUILDINGS AT SOUTH SHIELDS.—The Local Government Board has, it is stated, signified their intention of sanctioning the loan of 17,000*l.* to the Corporation of South Shields, for the purpose of erecting new police buildings. The loan is subject to an alteration in the plans rendered necessary by the sewerage works.

OBITUARY.

MR. EDWIN FOX.—Mr. Edwin Fox, founder of the firm of Edwin Fox & Bousfield, died on Monday last. Mr. Fox was born in the year 1820, educated at the Philological School, and, after having been articled to an estate agent at the West-end, commenced business as an auctioneer and surveyor in Coleman-street, being soon afterwards joined by Mr. Bousfield, and the firm was further augmented fifteen years ago by the accession of Mr. Fox's eldest son as a partner. Mr. Fox died at his residence, Heatham House, Twickenham, of inflammation of the lungs, after less than a week's illness.

MR. J. BLADWELL.—Mr. Joseph Bladwell, a member of the Bath Town Council, and a large builder and contractor, died on the 22nd ult., after a short illness. Among his largest contracts were the restoration of the Abbey, St. Andrew's Church, St. Paul's, St. John's and St. Mary's Catholic Churches, the Grand Pump-room Hotel, the National Provincial Bank, Manvers'-street Baptist Chapel, &c. He was sixty-four years of age.

GENERAL BUILDING NEWS.

PROPOSED NEW SICK CHILDREN'S HOSPITAL FOR EDINBURGH.—A "communicated" paragraph in the *Scotsman* of the 25th ult. informs us that the directors of the Royal Edinburgh Hospital for Sick Children have resolved to erect a new hospital upon the site of the present one. The present building, not having been originally intended for a hospital, is wanting in many of the modern conveniences which are now considered really requisite for such institutions, and the work of the hospital has outgrown the building. The directors feel, therefore, that the time has arrived when a new hospital should be built equal to the requirements of the city and the calls made upon it from the various parts of the country. Anxious consideration satisfied the directors that to meet thoroughly the public wants, and to admit of the instruction in children's diseases which such an hospital affords, the institution must be located as nearly as possible to the centre of the town. Before deciding to build on the present site the directors made full inquiry, but could not find any site available so well adapted and so central as the present. They have had the present site thoroughly examined, and are advised that a building can be constructed in every way suitable, not only as regards accommodation, but as regards light and air and sanitary conditions. Mr. Washington Browne has been instructed to prepare plans for the proposed new building.

NAZEING CHURCH, ESSEX. —The parish church of Nazeing, Essex, is now undergoing restoration under the direction of Mr. Walter F. Lyon, architect, of Craven-street, Strand. The building consists of nave, north aisle, chancel, and a fine brick west tower. The latter, with the aisle, appears to have been built in 1631, which date appears on the aisle wall on the nave side. This date may possibly allude to the restoration of the roof only, which, though good, is not Mediæval, having arch-moulded principals, which are at present much disfigured by plaster work. The aisle arches are Perpendicular, of a debased character, possibly built in Perpendicular times, but more probably, judging from the roughness of the style of work, carried out in 1631, the date on the walls. There are some good Perpendicular three-light windows in the chancel, and one very good Decorated two-light window in the nave. The whole church is in a very bad state, disfigured by bad reparations which cannot be called restorations. The chancel arch is of cement in a degraded Batty Langley style, the walls throughout are in a sad state of dirt, the coign stones of windows being concealed by plaster and the filth of ages. There are a few very fine oak seats with boldly-carved ends, almost Italian in their character. The whole exterior is a terribly mutilated conglomeration of flints, plaster, odd bits of stone, &c., the coign stones being concealed by cement. There is a very fine wood porch of the late Decorated period, with very good open timber, well-moulded work in a deplorable state of repair. This really beautiful porch appears to have been brought from somewhere else, as the roof cuts across the arch of the church door. It is proposed just now,—funds being scarce,—to build a new vestry and organ-chamber connected with the aisle and chancel by arches, to put a Decorated chancel arch of stone, to open out all the roofs, and to re-plaster the inner walls, exposing the stone dressings to the different openings. The work is being done by Mr. J. A. Hunt, of Hoddesdon.

THE NEW ENGLISH PRESBYTERIAN CHURCH AT LLANDUDNO has just been completed, at a cost, including schoolroom, of about 5,200*l.*, and was opened a few days ago. The plan is arranged with circular pewing, fixed in an isocoustic curve, which incline with the floor towards the pulpit; and the chapel being in one span, piers and columns are dispensed with, which enables the minister to be seen and heard by the whole congregation. Ample means of egress are provided by the entrances in Chapel and Gloddoeth-street, leading to tiled and parquet-floored porches and vestibules, the latter being constructed so that invalids may be conveyed with ease in their bath-chairs to the church, where accommodation is provided. Revolving-shutters in arched openings divide the church and schools, which may be thrown into one on crowded occasions. The external walls are built of a dark local stone, with Cefn stone dressings, and the angles of the church are constructed circular, to assist the acoustic properties. The style of the building is Gothic. The organ-chamber is placed at the extreme end, and projects from the main building. The roof is of a conical shape, with the timbers converging to the centre, forming an apex, on which is a slated octagonal flèche. The ceilings are panelled with moulded, decorated, and gilded ribs, and are coved at the eaves. The interior is fitted up in pitch-pine. The church is lighted with "Stott Thorp" patent coronas and gas-governors, and is heated on the high-pressure, small-bore system, fixed by Mr. Renton Gibbs, of Liverpool. Fresh air is admitted through inlet shafts, and the foul air carried away through decorated and ornamental ventilators fixed in the ceilings attached to shafts that are connected to a large air-pump (Boyle's patent) ventilator constructed in the flèche. The builder is Mr. W. H. Jones, Llandudno; the architect is Mr. T. G. Williams, of Liverpool.

THE NEW MANSION-HOUSE OF GOSFORD, N.B.—On the 21st ult. the Edinburgh Architectural Association visited the new mansion-house of Gosford, the property of the Earl of Wemyss, which was completed a short time ago. The *Scotsman*, in reporting the visit, says it is true that there has been within the Gosford policies since the beginning of the present century a "new" mansion-house, the erection of which was originally embarked upon many years earlier by the present Earl's great-great-grandfather. This house, designed by the brothers Adam, was completed in 1803, and in due course the valuable collection of pictures belonging to the house of Wemyss was transferred from the old house,—now demolished,—to that building. Soon after the pictures had been hung in their new quarters, however, an apprehension arose that the building was damp in consequence of sea-sand having been used in the mortar, and lest they should be damaged the collection was removed again to the old house, and the new mansion, partially demolished, remained tenantless. It is this building which Lord Wemyss has, at a great outlay of money, restored and worked into a palatial and complete mansion-house. The whole reconstruction was carried out to the designs and under the direction of Mr. William Young, architect, London. In addition to the internal reconstruction of the central portion of the original building which remained, new wings have been added on the north and south ends. At the south end of the building, which, including the wings, is in length 341 ft., is an entrance court-yard enclosed by an ashlar panelled and pilastered stone wall, corresponding with the architecture of the house: and there is a similar court-yard on the north side, known as the kitchen court-yard. The ground floor story is of rustic stone work, and on the west,—the sea,—and east,—the garden,—fronts of the original building is an arcading of a similar character extending about 10ft. from the old walls, and forming a *piazza* on the ground level, and on the principal floor a broad terrace connecting the two wings. From this terrace, to which the principal rooms open, charming views are obtained westward of the Firth of Forth as far as the Forth Bridge, while on the east side there are delightful vistas of the gardens and ponds which are a feature of Gosford policies. In the centre of the latter front is a grand flight of stairs, 38ft. in length, giving access to the gardens. The exterior of the sea-front of the central building is treated as a Corinthian order, extending the whole length of the wall above the terraces, with double pilasters at the ends and engaged columns in the centre. Between are large arched windows with a minor ordinance of the Ionic order. In the centre is a pediment over which, springing from an octagonal base, rises a dome, the outline of which must be familiar to all who have enjoyed the view of Aberlady Bay from the Calton Hill of Edinburgh. The Ionic order is carried through the new wings, which have a broken and picturesque outline, and the design adopted is such as to give to the whole composition a pyramidal form. The entrance is at the southern end of the house from the main avenue, and through a court enclosed by ashlar walls, designed in character with the architecture of the house. Passing through an outer hall—in design quiet and simple—entrance is obtained to the magnificent staircase hall, which is the feature of the interior of the mansion-house. The lower story of the hall is surrounded by solid walls, panelled in Caen stone and alabaster,—broken only by three doorways with alabaster architraves and over-doors and two niches for life-sized figures. On this wall for a base rises an arcading of alabaster and Caen stone, which extends around the four sides of the first floor. Facing the entrance door is an oval alabaster arch, resting on similar clustered columns and pilasters. A double marble staircase, starting on each side of the hall, is carried over this arch,—in treatment not unlike the Rialto Arch at Venice,—and meets in the centre, while inside the arch is a fine Italian chimney-piece in Istrian stone. The balustrade which extends up the staircase and continues round the first floor is of alabaster, with base

and capping in Caen stone. On the ground floor the hall is 38 ft. by 48 ft., but on the first floor it opens up by the arcading,—behind which extends a corridor overlooking the hall,—to 56 ft. by 70 ft., with a height of 45 ft. from the floor to the centre of the dome. This arcading is formed by a Corinthian main order in Caen stone, 20 ft. high, each side being divided by pilasters into four bays, and the ends into three bays. Each bay is again subdivided by a minor ordinance of the Ionic order into three, by a Venetian arch and side-openings formed with alabaster columns, pilasters, archivolt, and inlaid alabaster spandrels. A rich entablature in Caen stone completes the arcade, and above this springs a bold cove panelled and enriched in canvas plaster work. The ceiling is thence brought into the form of a circular dome, all in enriched canvas plaster. By the marble staircase is reached the principal floor, which contains the whole of the reception and living rooms, as well as the family bedrooms and most of the guests' rooms. The picture-gallery, which is first entered, is 63 ft. long by 20 ft. wide.

PROPOSED RESTORATION OF ST. JOHN'S CHURCH, PERTH.—A meeting of the General Committee appointed in connexion with the restoration of St. John's Church, Perth, was held in the Commissioners' Hall, Perth, on the 26th ult. The meeting approved of the scheme prepared by the sub-committee, and agreed to issue to the public a circular along with a plan of the scheme. The estimated cost of Mr. A. Heiton's plan was set down at 10,000*l.*

HIGHER GRADE SCHOOL, PORTSMOUTH.—At the meeting of the Portsmouth School Board on the 24th ult., the School Management Committee recommended the acceptance of Mr. W. Learmouth's tender, at 9,704*l.* 10s. 7d., for the erection of the new Higher Boys' School in Victoria-road North, and the appointment of Mr. Henry Lawrence, as clerk of the works, at a salary of 3*l.* 3s. per week. Mr. Lawrence was clerk of the works at the new Town Hall.

PROPOSED NEW CHURCH AT NEWLAY.—According to the *Leeds Mercury*, the plan of Mr. Fraser for a new church to be erected at Newlay, in connexion with Bramley Parish Church, has been unanimously accepted by the committee. It provides for 212 chairs in the nave, twenty-eight seats in the chancel, two vestries, and an organ-chamber. It is proposed to erect the church on a site between the canal and the Newlay station apjoining Pollard-lane.

CENTENARY HALL OF THE MASONIC INSTITUTION FOR GIRLS, WANDSWORTH COMMON.—The Centenary Hall of the Masonic Institution for Girls, Wandsworth Common, and a new wing containing a lecture theatre, six class-rooms, governesses' room, and six dormitories, were opened by the Prince of Wales on the 12th ult. The Centenary Hall is in the style of the transition period between the late Tudor and the Elizabethan. The side walls are arcaded, and a wall has been built between the extreme points of the buttresses, leaving seven deep recessed alcoves on each side of the hall. High up in these alcoves a floor has been inserted; the buttresses have been perforated, and in this way a gallery has been formed which affords a complete promenade round the hall. The seventeen windows with which the hall is lighted are all of stained glass, the designs being formed of the arms and crests of lodges and individual Freemasons who have been among the most generous donors to the institution. All the locks, with master-key arrangements, together with door furniture and brass lock plates, were supplied by Mr. James Hill, to the architects' special designs. The new Centenary Hall is also fitted with Hill's patent fanlight-openers to all the windows. The order for the sixteen large and specially-designed brass and copper gaseliers was also entrusted to Mr. Hill. The architects for the new wing were Mr. H. A. Hunt and Mr. Ralph Clutton, and the architects of the Centenary Hall were Messrs. H. A Hunt and F. G. Knight.

SANITARY AND ENGINEERING NEWS.

CONGRESS OF HYGIENE.—The Council of the Society of Arts, acting under the provisions of the Benjamin Shaw Trust, have offered two Gold Medals, or two prizes of 20*l.* each, to the Executive Committee of the Congress of Hygiene and Demography, for any inventions or discoveries of date subsequent to 1885, exhibited at or submitted to the Congress, and coming within the terms of the Trust. Under the conditions laid down by the donor, these prizes are to be offered for new methods of obviating or diminishing risks incidental to industrial occupations.

KINGS NORTON SEWERAGE.—The Rural Sanitary Authority of this Union, at its meeting on March 25th, received, approved, and adopted a scheme for dealing with the sewage of Northfield and Kings Norton, prepared by Mr. Robert Godfrey, Assoc. M. Inst. C.E., Engineer and Surveyor to the Authority. The scheme, which, with the purchase of land, will cost about £10,000, has been favourably reported on by Mr. E. Pritchard, M. Inst. C.E., to whom the Rural Sanitary Authority referred it. Application is to be made to the Local Government Board for the necessary sanction and loan at once.

BIRMINGHAM WATER SUPPLY.—The Birmingham Corporation recently called in Mr. Mansergh to consult with their own engineer as to the future sources of water supply, the present demand having arrived very closely to the available maximum from local sources. In accordance with his report, the Water Committee have resolved to recommend a scheme for the construction of reservoirs to impound the waters of the Elan and Claerwen in Merionethshire, tributaries of the Wye, and to bring the same to Birmingham by a conduit, from which supplies will, probably, be afforded to other towns on the way. The estimated cost is 4,000,000*l.* sterling.

FOREIGN AND COLONIAL.

FRANCE.—A Franco-Belgic hospital has been opened in rue Championnet, Paris, open to members of both countries.——The Château de l'Etang la Ville, which in the seventeenth century belonged to the famous Chancellor Séguier, is for sale.——MM. Le Seneschal de Kerdreoret, Couturier, Mascotte de Guivière, de Champeaux, Laboulaye, and d'Argence, have been appointed painters to the Ministère de Marine.——The landscape-painter Edmond Yon is to have an exhibition of his paintings, pastels, &c., at the Georges Petit Gallery on the 7th, 8th, and 9th of April, and they are to be sold on the 10th at the Salle Drouot.——M. Eugène Rigaut, former architect to the Post and Telegraph Department, has been appointed by the Government as architect to the Ecole de Pharmacie, in place of the late M. Charles Lainé.——There is talk of making near Dinard a large promenade like the Bois de Boulogne, to be connected with the town by a grand avenue.——The Minister of Public Works has just opened a new line of railway from d'Estrées St. Denis to St. Just and to Froissy.——A public subscription is to be raised for a monument to M. Meny, Mayor of Belfort during the seige of 1870.——A decree of the President has authorised the erection, in the Commune of La Brède, of a statue of Montesquieu. The sculptor Pierre Granet, of Bourdeaux, is commissioned to execute the work.——An International Exhibition of machinery, electric plant, and chemistry, is to be opened on May 15 at Toulouse, to close in September.——The Chair of Architectural History at the Ecole des Beaux Arts is vacant by the death of M. A. Lenoir. Architects desiring to enter as candidates for the post have to send in their demand to the Ministry of Public Instruction before April 10.——M. Felix Régamey, of Paris, has been commissioned by the artistic club of Brussels to prepare an exhibition of paintings illustrating the art of fencing.——Mdme. Anselma Lacroix, a Parisian artist, has just finished for the Salle d'Athenée, at Madrid, a fine ceiling painting, symbolising Eloquence, Peace, and the Fine Arts. The design is accompanied by two pendentives, one representing Truth and Ignorance, the other Poetry and Science.——The sculptor Frétigny, Professor in the Fine Art School of Marseilles, and much esteemed there, is just dead.——The Church of Etrelles near Vitré has been destroyed by fire, the bare walls only being left. It was only very recently restored.——It is announced that M. Charles Garnier has resigned the position of architect to the Church of Sacré Cœur at Montmartre, which he had recently accepted.——M. Theodore Ralli, pupil of M. Gerôme, has been named President of the Committee of organisation for the first picture exhibition to be held in Cairo.——As we announced, the château of Nohant was duly put up for sale, but as no purchaser presented himself, the property of George Sand remains in the hands of her heirs for the present.——M. Bienvenüe, "Ingénieur ordinaire" of the city of Paris, has been created Ingénieur-en-chef, and his former post filled by M. Widmer, Ingénieur des Ponts et Chaussées, who executed the harbour works at Havre.——An old sculptor in wood, M. Joseph Keller, has left his fortune to the city of Paris in trust for the foundation of an annual prize, to be called the "Prix Keller," to the best pupils issuing from the professional schools in Paris.——The Ministry of Public Instruction and Fine Arts has ordered the immediate undertaking of the necessary repairs to the church of the Madeleine of Vézelay. The architect of the "Monuments Historiques" for the Department of the Yonne has been urging every year the dangerous condition of the church. It is to be hoped that the work will be confined strictly to such repairs as are necessary for the stability of the structure.

BERLIN.—At the "Landesausstellungs-Park," in the Exhibition buildings of which the International Art Exhibition is to be opened on May 1, great activity can be noticed, the arrangement and adaption of the halls for this purpose having been taken in hand and exhibits already arriving in great numbers, among them a batch of some 280 pictures from Spanish artists, and some seventy-five Belgian works of art. The last receiving-day for exhibits is, as we have already stated, April 10. On May 19, the anniversary of the formation of the "Verein Berliner Künstler," under whose auspices this Exhibition is being arranged, some great fêtes are planned, in connexion with which a so-called "Künstlerfest," with procession (period: Charles the Great), will be held on May 21, and promises to be a very imposing spectacle.——The Anthropological Society intend trying to push through their idea of having a large German "National" Museum erected at Berlin, and have now taken steps to interest the Imperial Government in the matter. This is now the fourth large museum design on paper, of which number only one, the proposed classical museum (architect, Professor F. Wolff), one of the three to be placed on the so-called "museum island," has for the present any hope of seeing its completion within a reasonable space of time.——Dr. Schliemann's book, "Report on the Troy Excavations of 1890," is to be brought out next month, by the Leipsic publisher, Brockhaus. The preface is by Mrs. Schliemann, and several of the important paragraphs have been written by Dr. Dörpfeld. Dr. Schliemann's biography, which is to be an extension of the one to be found in his "Ilios," is to be published shortly, Mrs. Schliemann having taken the matter in hand.——German architects have been invited to compete for the Boissonet Bursary, value 150*l.*, given under the auspices of the Royal Technical College. The successful candidate is required to spend a summer in Sweden, and to there measure up the Romanesque Cathedral at Lund.

ULM.—It has now been officially stated that it will still take three years to complete the work on the Ulm Cathedral, the spire of which was finished last summer.

MISCELLANEOUS.

A CLIFF TRAMWAY-LIFT AT HASTINGS.—The new lift at the West Hill, Hastings, was opened on the 25th ult. The lift has been designed to afford a ready and easy means of access to the top of the West Hill, with its beautiful views and fresh breezes, which have hitherto only been attainable by the young and vigorous by considerable exertion. It also affords a means of communication between the town of Hastings and the outlying districts of Ore and Halton, which are rapidly growing into importance. To enable the lift to reach the top of the hill it was necessary to drive a tunnel a length of about 363 ft., the total length of the track being 450 ft., at an inclination of about 1 in 3. As in this case the travel is longer and the gradient less than in the Folkestone lift, the motive power is derived from a 16-h.p. Otto gas-engine, fixed in an engine-room at the top of the track, and driving through a counter-shaft on to a very powerful set of double-worm and wheel-gearing, giving motion to a large cast-iron wheel round which the steel-wire ropes pass to the cars. The gearing drives in either direction, and it is claimed that the lift is always absolutely under control, and can be stopped at any point by the attendant. When either car arrives at the top the lift is stopped automatically, so that in the event of inattention, or accident to the attendant, the cars would come to a standstill of themselves at the end of the journey; and it is added that if a driving-band should break, the cars would at once become stationary. There is also an automatic governor to arrest the lift in case of an excessive speed being attained. There are two cars, each arranged to carry sixteen persons, made of teak and ash, and suitably upholstered. Each car is fitted with a safety apparatus, consisting of a double set of powerful clutches with teeth, connected with two strong springs; these pass on each side of an oak timber fixed between the rails, and in the event of the ropes breaking the cams would close on the timbers and hold the car in position. The cars are connected by two powerful steel wire cables, each equal to a breaking strain of about twenty tons, so that every portion of the work has been constructed so as to afford an ample margin of strength and safety. The work has been carried out by Messrs. R. Waygood & Co., of Falmouth-road, London, S.E., for the Hastings Lift Company, under the supervision of their architects, Messrs. F. & J. Plowman, who originated the scheme, and the construction of the tunnel and track was executed from their plans by Messrs. Holme & King.

THE CONSISTORY COURT OF LONDON.—On November 15th last we adverted to a faculty which had been granted to the City of London Real Property Company for opening some ancient lights that overlook the churchyard of St. Gabriel, Fenchurch. On Wednesday, 25th ult., an additional faculty was granted by the Consistory Court of London, sitting in St. Paul's, in respect of a fresh right of way across the burial ground. The Company in question are owners in fee of Nos. 35 and 36, Lime-street. In April last the rector and churchwardens agreed to give to the Company a right of way from Fen-court to their premises, for a term of eighty years, at a yearly rental of £45, payable to the rector; the Company to lay out, pave, and fence in with iron railings and gates, the pathway. The Lord Chancellor, the Corporation, and the Vestry consenting, Dr. Tristram, Chancellor of the Diocese, gave the faculty as asked for, it being agreed that the public should have use of the pathway during certain hours and on certain conditions. The Court then proceeded to grant a faculty for authorising alterations in St. Paul's church, Camden-square, comprising the erection of a chancel screen with gates. This church was built about forty years ago, after the designs of Messrs. Ordish and Johnson, architects.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised	Premium.	Designs to be delivered.
*Public Hall and Offices, Earlestown	Newton-in-Mackerfield Commissioners	50*l.* 25*l.* and 15*l.* ..	May 14
*Treatment of Sewerage	Aylesbury Local Board	Not stated	No date
*School House	St. Marks, New Swindon Committee	do.	do.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Road Works	Hendon Local Board	S. S. Grimley	April 6
Timber, Kerbing, Pitching, Road Metal, &c.	Swansea Town Coun.	*Official*	April 7
*Kerbing, Paving, &c. &c.	Lewisham Bd. of Wks	do.	do.
Parish Church, Ballymacarret, Ireland	Rev. G. G. Mervyn	Samuel P. Close	do.
Maintenance of Roads	Blackrock (Ireland) Town Commrs.	*Official*	do.
Sewering and Paving	Belfast Corporation	do.	do.
*Sanitary Works	Metro. Asylums Board	W. D Young	April 8
Police Station and Residence, Plymouth	Plymouth Corp.	Geo. D Bellamy	do.
Alterations to Property, Elgin, N.B.		Chas. C. Doig	do.
Road Materials	Cerne (Dorset) Highway Board	*Official*	do.
Public Baths, &c. Templemore-avenue	Belfast Corporation	do.	do.
Farmhouse, Charlton Musgrove, near Wincanton	Mrs. Malpas	Hudson & Martin	April 9
House, Shop, &c. Crawcrook, nr. Ryton	Wm. Allen	John Harkness	do.
Stoneware Pipe Sewers (2,450 ft)	Devonport Twn Coun.	J. F. Burns	do.
Two Shops and Dwelling-house, Bramley, Leeds	Leeds Indus. Co-op. Soc. Lim.		do.
Silo House, Drying Kilns, &c. Bishopwearmouth	E. & F. Richardson	Joseph Potts	do.
*Tar Asphalting	Twickenham Loc. Bd.	H. M. Ramsay	do.
Cast Iron Pipes	Manchester Corpraton	*Official*	do.
Chapel at Cemetery	Conisbrough Burial Bd	George White	do.
Bacon Factory, Redruth	West of England Bacon Curing Co.	Oliver Caldwell	April 10
Supply of Materials	Bootle Corporation	*Official*	do.
House, Pill, Somerset	W. H. Gillmore	E. H. Edwards	do.
Iron Fencing, Baddiley Mere	Nantwich Local Bd.	W. S. Williamson	do.
New Cemetery Chapel at Durham County Lunatic Asylum	Visiting Committee	Wm. Crozier	April 11
*Road Materials	County of Chester	S Bull	do.
Premises, Blandford, Dorset		W. J. Fletcher	do.
9 Cottages, Cymmer, Glyncorrwg, near Pontypridd	George Evans	A. O. Evans	do.
*Asphalte Road Works	St. Giles Board of Wks	C. Wallace	April 13
*Painting, Cleaning, and Repairing Works	Metro. Asylums Board	*Official*	do.
*Tar Paving	Bournemouth T. C.	F. W. Lacey	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Two-storey Goods Shed (1,376 ft. in length)	Clyde Navigation Trus	Jas. Deas	April 13
Road Materials	Hoo (Rochester) Highway Board	T. W. Price	do.
Police Station, Failsworth	Lancashire C.C.	W. T. Gunson	do.
Police Station, Levenshulme	do.	do.	do.
New North Pier	Arklow Harbor Comrs	W. G. Strype	do.
*Sewerage Works, Mitcham-lane	LondonCountyCouncil	*Official*	April 14
New Road, George Inn	Gelligaer Highway Bd.	W. Bevan	do.
*Making-up Carriageways and Paving Footways	Willesden Local Board	O. Claude Robson	do.
*Pipe Sewers, &c.	do	do.	do.
Schools, Cadbury Heath, near Warmley	Oldland School Board	Bernard & Drake	do.
Heating Schools, Kingswood, near Bristol	do.	W. L. Bernard	do.
Re-building Church, Waterloo, Liverpool		Paley, Austin & Paley	do.
*Pipe Sewers, &c.	Fulham Vestry	J P. Norrington	April 15
*Roadmaking and Paving Works	do.	W. Sykes	do.
Police Station, Masham, Yorks	N. R. County Council	Walker Stead	do.
*Drainage Works at Lambeth Infirmary	Lambeth Guardians	T. W. Aldwinckle	do.
Repairs to several Police Stations	Dorset Standing Joint Committee	*Official*	do.
*Public Works	Southampton Corp.	W. B G. Bennett	April 2
*Four Miles of Cast-iron Socket Pipes	Coventry Waterworks	T. & C. Hawkesley	do.
New Cemetery	Witton & Dane Bridge (Cheshire Burial Brd	Jas. Holland	April 22
*New Post Office at Blackpool	Com. of H.M. Wks, &c	*Official*	April 24
*New Offices	New Barnet Valley Local Board	F. W. Shenton	April 27
*General Works, Extending Goods' Warehouse and Offices	W. E. Ry. Co.	W. Bell	April 29
*Shop Buildings, Brentwood	W. A. Wilson & Co.	E. N. Cubitt	No date
*New Grammar School, Chelmsford	King Edward VI. Grammar School	H. A. Cheers	do.
Forty Bee-hive Coke Ovens, near Annfield Plain, co. Durham	South Moor Coll. Co.		do.
Draining, &c. Twenty Houses, Leeds	A. F. Holroyd		do.
Two Dwelling-houses, Francis-street, Leeds		Geo. Hutton	do.
109 Cottages, Denaby, Yorks	H. Arnold & Sons		do
Steel Girders, Beams, &c.	Coatbridge (N.B.) T.C.	A. M'G. Mitchell	do.
Wesleyan Chapel and School, Bentley, near Doncaster		C. J. Innocent	do
Church, Heap Bridge, near Heywood, Manchester		John Lowe	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary	Applications to be in
*Assistant Secretary	Architectural Assoc.	100*l.*	April 7
*Sanitary Inspector	Westminster Vestry	120*l.*	April 15
*Architectural Draughtsman	Wakefield Coun. Surv.	2*l.* 10*s.*	No date

Those marked with an Asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv. vi. *and* ix. *Public Appointments, p.* xx.

PROPERTIES FOR SALE. — By private contract: Cors-y-Gedol, on the west coast of Merionethshire, between Harlech and Barmouth, consisting of more than 5,000 acres, and an old Elizabethan residence. Three large lakes and the River Ysgethin provide good fishing, and a seaward track of about 1,000 acres could be converted into a golf-link and to building purposes. By auction, at Edinburgh, on the 22nd instant, the Penicuick estate, in Midlothian and Peeblesshire. This property, of nearly 10,600 acres, and yielding an aggregate rental of 8,196*l.*, besides that of the house and shootings, will be offered at an upset price (reduced) of 210,000*l.* Penicuick House, on the North Esk, was built in 1761, for Sir James Clerk, Bart., who employed Runciman to decorate the ceiling of the "Ossian's Hall." Hard by stand the ruins of Brunstane Castle, and Logan House, an ancient hunting-seat. Sir James Clerk set up in his grounds an obelisk to Allan Ramsay; Newhall, Linton, and Habbie's How, on Glencross burn, in the neighbourhood, have been identified with some of the scenery described in the "Gentle Shepherd." And by public sale, at Edinburgh, on the 15th instant, the Dunalastair estates, in Perthshire, including Lochgarry, Kinloch Rannoch, Dunalastair, Crossmount, &c., and extending over 20,000 acres in all. These sporting properties will be "exposed" at an upset price of 140,000*l.* Loch Rannoch, on their western border, is famous for its situation and as the scene of some memorable episodes of early feudal history in Scotland.

LIVERPOOL ENGINEERING SOCIETY.—The ninth ordinary meeting of this Society was held at the Royal Institution, Colquitt-street, on Wednesday evening, March 18. A large number of members had assembled when the President, Mr. Ferdinand Hudleston, Assoc. M. Inst. C.E., took the chair. The principal business of the evening was the adjourned discussion upon Professor H. S. Hele Shaw's paper, entitled "The Education of an Engineer," which was read at the last meeting of the Society. The President opened the discussion, and, in his remarks, emphasised many of the points bought forward in the paper. He thought the preliminary education of an engineer should be as broad as possible, and urged in particular the value of the study of the higher mathematics. He also impressed upon the meeting the value of scientific societies, and the benefits to be obtained from them. — Mr. George Farren referred to the Continental system of training, and gave particulars of various courses of studies adopted in the Government schools in Holland for the preparation of engineers.—Mr. Henry H. West dealt principally with what he called the half-time system of training, six months' College, and six months' work, and entered an energetic protest against such a system. He advocated the old-fashioned principle of five or seven years' apprenticeship in the shop or office, and suggested that that should be followed, if possible, by two years of college training.—Mr. Andrew Higginson spoke from experience with his own apprentices in favour of this system, by which the engineering student had six months' work in the shops in the summer, and six months' training in the college in the winter.—Mr. J. H. T. Turner thought that the student should first be brought face to face with the commercial aspect of his profession, and later on, when he has seen what is actually done, and what has to be done in the shops and offices, in the field or on works, then let him give some time to scientific study of the principles that underlie what he has seen practised.—Mr. Robert E. Johnston looked upon technical engineering colleges as extremely valuable, and spoke as to the value of technical education to the artisan class.—Mr. Coard S. Pain spoke in favour of the present English system as against the Continental system.—Upon the termination of the discussion, Professor Hele Shaw replied to various queries that had been put and objections that had been made with regard to points raised in the paper, and a unanimous vote of thanks terminated the proceedings.

THE ENGLISH IRON TRADE.—The holidays and the nearness of the quarterly meetings have both contributed towards making the past week one of the quietest of the year. The market is still weak and prices are nominal, and in cases where actual business is put through they are generally in favour of buyers. Only a very moderate business has been done in pig-iron, and at lower prices. Warrants have pursued their downward course, and Middlesbrough pig-iron is 6d. a ton cheaper. As a rule, makers have ceased quoting altogether, as no satisfactory terms can be secured by them, thinking it the wiser plan to await the result of the quarterly meeting. A similar feeling exists in the manufactured iron trade, and bars and sheets are 2s. 6d. lower in price. There is an easy tone in tinplates, which are quiet. The steel trade is hardly better than the finished iron branch, but there are more inquiries for rails. Shipbuilders are not booking nearly the tonnage they are launching, and are looking forward to quieter times. Engineers, although fairly well engaged at present, are beginning to feel the effect of a reduced inquiry.—*Iron.*

THE GOVERNMENT BUILDING CONTRACT.—There appears to be an uncertainty in the building trade as to the terms upon which the new triennial building contract of the Government has been offered and accepted. "Is sub-contracting prohibited?" is asked by one, "Is overtime to be fully paid for?" by another. Without going into the matter in detail it may be said in answer to the first question that while sub-contracting is not wholly forbidden, clauses have been inserted in the agreement between the Office of Works and the contractor by which the sweating, at all events, will be rendered impossible even should the contractor wish it. "Sub-contracting" is becoming a somewhat ambiguous term, and the best method of judging of its merits and demerits is by estimating the good and the evil it represents in each particular case. If it mean the relegation to special industries of the small portions of a contract which do not come within the range of the operations of the contractor-in-chief, then, under proper restrictions, there is little to be said against it; if it represent in the slightest degree a propagation of the sweating evil it ought to be abolished entirely. As to payment for extra work, we are informed that the attention of the Office of Works has been directed to the discouragement of overtime, and to insisting that where overtime is necessary it shall be paid for at the rate prevailing in the trade.—*Evening News and Post.*

MEETINGS.

SATURDAY, APRIL 4.

Association of Public Sanitary Inspectors.—Dr. G. Danford Thomas on "Burial and Funeral Reform." 6 p.m.

MONDAY, APRIL 6.

Royal Institute of British Architects.—Mr. William Simpson on "Mutation in Indian and Eastern Architecture." 8 p.m.

Surveyors' Institution.—Mr. C. Fortescue Brickdale on "The Present Work of the Land Registry." 8 p.m.

Builders' Clerks' Benevolent Institution. — Annual Dinner, Cannon-street Hotel. 6 p.m.

Society of Engineers.—Mr. T. B. Lightfoot on "A Trial of a Refrigerating Machine on the Linde System." 7.30 p.m.

Clerks of Works Association (Carpenters' Hall).—Ninth Annual Meeting. 8 p.m.

Royal Institution.—General Monthly Meeting. 5 p.m.

Liverpool Architectural Society.—Paper by Mr. W. E. Hill. 7 p m.

TUESDAY, APRIL 7.

Institution of Civil Engineers.—Mr. R. E. B. Crompton on "The Cost of the Generation and Distribution of Electrical Energy." 8 p.m.

Society of Biblical Archæology.—(1) Mr. J. Pollard on "The Baal and Ashtoreth Altar Discovered at Kanawat in Syria, now in the Fitzwilliam Museum, Cambridge." (2) Paper by the Rev. C. J. Ball. 8 p.m.

Glasgow Architectural Association.—Mr. Robert Wemyss on "The Life and Work of Michelangelo." 8 p.m.

WEDNESDAY, APRIL 8.

Society of Arts.—Mr. A. P. Laurie on "The Durability of Pictures Painted with Oils and Varnishes." 8 p.m.

THURSDAY, APRIL 9.

Society for the Encouragement of the Fine Arts.—Mr. T. L. Southgate on "A Phase of Ancient Egyptian Art." 8 p.m.

Institution of Electrical Engineers.—Mr. W. B. Esson on "The Design of Multipolar Dynamos." 8 p.m.

Society of Antiquaries.—8.30 p.m.

Edinburgh Architectural Association.—Mr. A. H. Millar on "Curiosities of Architecture in Dundee." 8 p m.

Dundee Institute of Architecture.—Mr. A. Hutcheson, F.S A Scot., on "The Sculptured Stones of Scotland." 8 p.m.

FRIDAY, APRIL 10.

Architectural Association.—Mr. Percy D. Smith will read "The Travelling Student's Notes." 7.30 p.m.

Institution of Civil Engineers (Students' Meeting).—(1) Mr. W. W. F. Pullen on "Modern Locomotive Construction." (2) Mr. John H. Barker on "The Design of Locomotive Cylinders." 7.30 p.m.

Royal Institution.—Sir William Thomson on "Electric and Magnetic Screening." 9 p.m.

SATURDAY, APRIL 11.

Architectural Association —Visit to the Church of St. John the Baptist, Holland-road, Kensington. 3 p.m.

Royal Institution.—Professor Silvanus P. Thompson on "The Dynamo." I. 3 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

7,318.—SEWERAGE SYSTEM: *W. Hallock.*—This invention relates to a system of drainage, consisting of a succesion of man-holes with bottoms on the same level, and connecting-pipes placed on the same level grade. The whole sytem is trapped by a single trap, which is formed by placing the discharge-pipe on the last man-hole above the level of the connecting-pipes.

9,180.—VENTILATING FANS: *H. W. Waddle.*—The fan which is the subject of this patent is provided with a band or partial covering which contracts the available outlet, and utilises a larger percentage of the power required to work the ventilating fan.

13,134.—BRICKS, SLABS, &c.: *C. D. Abel.*—To make porous and fire-proof bricks and similar articles used for building purposes, the inventor uses a volcanic material (pumice-sand or pumice-gravel), which is mixed with slaked lime or gypsum or cement. The bricks are very light, porous, and fireproof, and, possessing a rough surface, bind together most effetually when laid in mortar or cement, affording a very efficient keeping surface for plastering.

16,619.—VENTILATING FANS: *H. W. Waddle.*—In open running fans the blades are, by this invention, arranged so that the air is less suddenly forced into motion, and thus less power is required to drive the fan.

19,329.—IMITATING WALNUT WOOD: *P. Jaeger.*—To imitate walnut wood the inventor employs the following method:—Planks of inferior wood are piled in a closed air-tight chamber, with walnut husks between them, some of the husks being treated with a mixture of ebony and iron-filings, so that by the action of steam the wood may acquire a colour shading and graining like walnut wood.

IMPROVED WINDOW SASH-STOP: *J. Pollock.*—This invention consists of a window stop in two pieces, one a boss or plug fitting into the side of upper sash, about 3 in. above the lower one with a hole in it; the other being a split pin fitting tight into the hole of boss and projecting over the under sash, to prevent either sash going beyond it.

2,507.—SQUARE TURNING BALUSTERS, &C.: *E. Cutlan.*—The chief object of this invention is to provide means whereby the strips or pieces can be easily removed, and the whole surface of the drum can be covered, notwithstanding the width of the strips. To effect this holding flanges and fittings are adapted to allow the strips to be placed closely on the drum.

NEW APPLICATIONS FOR PATENTS.

March 16.—4,626, J. Burghes, Joint for Drain-pipes.—4,635, J. Chaffer, Securing Sashes, &c., when Opened or Closed.—4,657, L. Forester & H. Greatbatch, Composition for Economy in Placing Glazed Tiles or Plaques, &c., Majolica and Earthenware in Kilns or Ovens, also Washing Kilns.—4,665, D. Tuley, Hinges.—4,671, W. Hart & J. Graham, Fastening of Skylights, &c.—4,672, E. Olson, Stucco for Plastering.—4,686, R. Warren, Fastening Attachment for Gates.—4,691, S. Phipps & R. Stephens, Fastenings for Window Sashes.

March 17.—4,725, S. Thompson & J. McEwen, Syphon Well for Water-closets and other Cisterns.—4,743, N. Dobbs, Indicator for Doors.—4,750. The Société Anonyme des Ardoisieres de Deville & Victor Van Der Heyden, Material for Building, Pairing, &c., from Waste Pieces or Débris of Slate.—4,759, H. Butson, Folding Safety Steps or Ladders.—4,765, F. Simonson, Machinery or Apparatus for Handling Logs in Saw Mills.—4,779, T. James, Glazed Panels for Furniture and Interior Decorative Work.

March 18.—4,819, J. Southall, Flushing Cisterns.—4,836, E. and J. Hutchings, Press-down Lever for Fastening and Opening Doors.

March 19.—4,940, H. Woodhouse, Fire Grates or Stoves.—4,948, H. Smith, Plane for Beading and Side Fillister.

March 20.—4,962, A. Goerke, Buildings or Structures.—4,973, J. Wilson, Checking or Registering and Indicating Workmen's Time.—4,981, H. Clark, Stench Preventer, Drain Ventilator, and Improved Trap, for all purposes, all shapes, and all sizes of drains.—4,983, F. Smith and J. Corbett, Iron Casements and Frames.—4,990, J. Boyd-Wilson, Compositions for Use in Building Constructions, &c.—4,997, J. Bennett, Roof Tiling.—5,028, W. Horn, Ventilating and Heating the Walls of Buildings.—5,032, W. Thompson, Construction of Towers, Chimneys, &c.—5,041, H. Leigh, Waterclosets.

March 21.—5,068, F. Quéry, Kilns for Use in the Manufacture of Pottery, &c.—5,069, A. Smith, Ornamentation of Wood, &c.—5,081, W. Munns, Door-hanger.—5,123, W. Longmire, Rain-water Stacks or Gutter Pipes, &c,—5,127, J. D'Alemeida and another, Fire-Indicating Apparatus.

PROVISIONAL SPECIFICATIONS ACCEPTED.

704, H. Dixon and H. Cohen, Veneering Cabinet-furniture, &c.—1,403, C. Pfister and J. Schmidt, Flushing Cisterns.—2,831, F. Podger, detaching Sashes from window-frames and raising and lowering same without weights.—3,276, R. Whitaker, Wood and other Screws.—3,353, A. Francombe, Slow Combustion Fire Stoves.—3,459, J. Hamilton, Fire-grates.—3,550, W. Barns and J. Cockburn, Wheelbarrows.—3,610, A. Steele and W. Cunningham, Stoves or Fire-grates.—3,637, T. Brown, Ventilators for house drains, &c.—3,734, P. Bright, Lavatory Basins.—3,747, H. Snell, Water-closets, &c.—4,102, A. Morison, Lock or Latches for Water-closets, &c.—4,247, J. Adair, Baker's Ovens.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

7,822, D. Cliff, Effecting Correct Designs on Decorative Tiles.—18,667, H. Heiland and J. Kaufmaun, Scaffolding.—2,865, H. Williams, Composition for Paving &c.—3,147, J. Meyer, Coupling of Outlet or Discharge Pipes with Sewer or Drain Pipes.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

MARCH 19.—By *Dyer, Son, & Hilton* (at Lee): 193, High-rd., Lee, u.t. 37 yrs., g.r. 18*l.*, r. 55*l.* p.a., 470*l.*; 52, 54, and 56, Church-st., and plot of land, u.t. 37 yrs., g.r. 6*l.*, r. 45*l.* 10s., 360*l.*; 20, Dacre Pk., u.t. 35 yrs., g.r. 3*l.* 10s., r. 30*l.*, 165*l.*

MARCH 23.—By *Moss & Jameson:* 179, Albion-rd., Stoke Newington. f., 2,010*l.* By *Chesterton & Sons:* 92, Gloucester-ter., Hyde-pk., u.t. 52 yrs., g.r. 18*l.*, £2,110*l.* By *Edward Wood:* 152, Meyrick-rd, Battersea, f., r. 24*l.* 14s., 275*l.*; 8, 9, and 10, Ingoldisthorpe-grove, Old Kent-rd., f., r. 71*l.*, 840*l.*; 126, Eastfield-st., f., r. 18*l.* 4s. p.a., 135*l.*; 8, Roskill-rd., Putney, u.t., 94 yrs., g.r. 5*l.* 10., r. 42*l.* 18s., 250*l.*; 52, Alkham-rd., Stoke Newington, u.t. 86 yrs., g.r. 28*l.*, 470*l.*; The Residences "Albert House," "Gladstone House," and "Granville House," Tetcott-rd., Chelsea, u.t. 91 yrs., g.r. 30*l.* 12s., r. 317*l.*, 1,425*l.* By *W. & F. Houghton:* 184, Camberwell-grove, Denmark-hill, f., 610*l.*; the residence "Roxburgh," Prospect-hill, Walthamstow, f., 650*l.* By *Alfred Richards:* 84 and 86, Marylebone-lane, Manchester-sq., u.t. 9 yrs., g.r. 42*l.*, 400*l.* By *J. H. Bulmer:* 38, Cooper's-rd., Old Kent-rd., u.t. 41 yrs., g.r. 4*l.* 10s., r. 33*l.* 16s., 220*l.* By *E. H. Sales:* 17, Cambridge-rd., Lee, u.t. 73 yrs., g.r. 10*l.*, 300*l.*

MARCH 24.—By *R. W. Scobell:* Leasehold g.r. of 126*l.*, Mecklenburgh-sq., u.t. 18 yrs., g.r. 62*l.*, 635*l.*; 44, King's-cross-rd., Clerkenwell, f., r. 50*l.*, 750*l.*—By *Vaughan & Co.:* 20, Acacia-rd., St. John's Wood, u.t. 43, yrs., g.r. 10*l.*, r. 55*l.*, 450*l.*—By *Debenham, Tewson, & Co.:* 203 and 205, Queen's-rd., Dalston, u.t. 38 yrs., g.r. 2*l.*, r. 107*l.* 10s., 1,000*l.*; 94, Beulah-hill, Norwood, u.t. 78 yrs., g.r. 20*l.*, 730*l.*—By *Farebrother, Ellis, & Co.:* 112, Queen's-rd., f., 920*l.*; an enclosure of f. land, East Ham, 8a. 2r. 15p., 1,200*l.*; an enclosure of f. land, 50a. 3r. 8p., 4,000*l.*—By *E. Tabernacle:* 1, 2, 7, and 8, Prospect-pl., Woodford, f., r. 64*l.*, 430*l.*; 2 to 10, Vicarage-ter., Leyton, f., 2,325*l.*; 1 to 8, Avenue-rd, f., 1,190*l.*

MARCH 25.—By *A. Young:* Two plots of f. land, Armada-st., Deptford, area 25,823 ft., 1,460*l.*; A plot of f. land, Trevithick-st., area 5,280 ft., 400*l.*; a plot of f. land, Benbow-st., area 6,980 ft., 850*l.*; 23, Mount Pleasant, Clerkenwell, f., area 2,237 ft., 1,520*l.*; a plot of f. land, Kentish-town-rd., area 9,760 ft., 3,600*l.*; a plot of f. land, Brook-st., Limehouse, area 1,116 ft., 120*l.*; two plots of land, Rosebery-av., Clerkenwell, area 1,501 ft., let for 80 yrs. at 37*l.* a year; two plots of land, area 1,664 ft., let for 80 yrs. at 34*l.* a year; six plots of land, area 8,641 ft., let for 80 yrs. at 208*l.* a year; a plot of land, Coldharbour-lane, Camberwell, area 1,970 ft., let for 80 yrs. at 22*l.* a year. By *Jenkins & Sons:* 70, Wickham-rd., Brockley, u.t. 81 yrs., g.r. 24*l.*, 1,300*l.*—By *W. Andrews & Son:* 1 to 4, Sussex-pl., Mortlake, 1 and 2, Sussex-cottages, and "Elizabeth Cottage," u.t. 58 yrs., g.r. 14*l.*, r. 109*l.* 16s., 710*l.*—By *R. J. Collier:* 132 and 134, King Edward's-rd., Hackney, u.t. 48 yrs., g.r. 13*l.*, 1,100*l.*; a plot of freehold land, Muswell Hill, 1a. 1r. 18p., 300*l.*—By *R. Tidey & Son:* 15, Southgate-rd., Kingsland, u.t. 27 yrs, g.r. 8*l.* 15s., 215*l.*

MARCH 26.—By *C. E. Joy:* 1 Cottage-pl., Kensington, u.t. 29 yrs., g.r. 3*l.*, r. 40*l.*, 350*l.*—By *T. Young:* 9, Hampton-rd., Forest Gate, u.t. 85 yrs., g.r. 8*l.* 16s., r. 35*l.*, 285*l.*—By *Dyer, Son, & Hilton:* "Alison Lodge," Court-rd., Eltham, u.t. 75 yrs., g.r. 50*l.*, 2,500*l.*—By *A. Cole & Co.:* 84 and 88, Wharton-rd., Kensington, u.t. 89 yrs., g.r. 11*l.*, 800*l.*; 26, Hayter-rd., Brixton, u.t. 76 yrs., g.r. 8*l.*, 445*l.*; 2 and 4, Poultney-st., Islington, u.t. 14 yrs., g.r., 10*l.*, r. 56*l.*, 165*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS

TIMBER.		
Greenheart, B.G.	ton	6/10/0 7/15/0
Teak, E.I.	load	8/10/0 14/0/0
Sequoia, U.S.ft.cu.		2/3 3/0
Ash, Canada	load	2/10/0 4/5/0
Birch, do.		2/5/0 4/5/0
Elm, do.		3/10/0 4/15/0
Fir, Dantsic, &c.		2/0/0 3/15/0
Oak, do.		2/10/0 4/10/0
Canada		4/17/6 6/10/0
Pine, Canada red		2/10/0 3/10/0
Do, yellow		2/0/0 5/10/0
Lath, D'ntsic, fath		5/0/0 6/0/0
St. Petersburg		5/0/0 7/0/0
Deals, Finland, 2nd & 1st std	100	7/0/0 10/0/0
Do, 4th & 3rd		7/0/0 8/0/0
Do. Riga		6/0/0 7/10/0
St. Petersburg, 1st yellow		9/10/0 14/0/0
Do. 2nd yellow		8/0/0 9/0/0
Do. white		6/10/0 10/0/0
Swedish		6/10/0 15/0/0
White Sea		8/0/0 16/10/0
Canada, Pine 1st		13/0/0 24/0/0
Do. do. 2nd		9/0/0 15/10/0
Do. do. 3rd, &c.		6/10/0 10/0/0
Do. Spruce. 1st		8/10/0 10/10/0
Do. do. 3rd & 2nd		6/0/0 7/10/0
New Brunswick		5/0/0 7/0/0
Battens, all kinds		3/10/0 15/10/0
Flooring Boards, sq., 1 in. prep. 1st		0/10/0 0/14/0
Do. 2nd		0/9/0 0/10/6
Other qualities		0/5/0 0/7/6
Cedar, Cuba	ft.	/4 /4½
Honduras, &c.		/4 /4½
Mahogany, Cuba.		/4½ /6½
St. Domingo, cargo av		/4½ /6½
Mexican do. do		/4½ /5½
Tobasco do. do		/5½ /7
Honduras do.		/5½ /6½
Box, Turkey	ton	4/0/0 13/0/0
Rose, Rio		10/0/0 20/0/0
Bahia		9/0/0 18/0/0

TIMBER (*continued*).		
Satin, St. Domingo	ft.	0/0/10 0/1/3
Porto Rico		0/0/9 0/1/6
Walnut, Italian		0/0/3½ 0/0/7
METALS.		
IRON—Bar, Welsh, in London	ton	6/5/0 6/15/0
Do. do. at works in Wales		5/15/0 6/5/0
Do. Staffordshire, in London		6/5/0 7/0/0
COPPER—British, cake and ingot		56/0/0 57/0/0
Best selected		59/0/0 60/0/0
Sheets, strong		66/0/0 0/0/0
Chili, bars		52/10/0 0/0/0
YELLOW METAL	lb.	0/0/6 0/0/6½
LEAD—Pig, Spanish	ton	12/12/6 0/0/0
English, com. brands		12/15/0 13/0/0
Sheet, English, 3 lbs. per sq. ft. and upwards		14/5/0 0/0/0
Pipe		14/10/0 0/0/0
ZINC—English sheet	ton	26/10/0 0/0/0
Vieille Montagne		27/0/0 0/0/0
TIN—Straits		90/10/0 0/0/0
Australian		90/15/0 0/0/0
English Ingots		94/10/0 0/0/0
OILS.		
Linseed	ton	22/10/0 22/15/0
Cocoanut, Cochin		36/0/0 0/0/0
Do. Ceylon		30/0/0 0/0/0
Palm, Lagos		27/0/0 0/0/0
Rapeseed, English pale		29/15/0 30/0/0
Do. brown		28/5/0 28/10/0
Cottonseed ref.		21/10/0 0/0/0
Oleine		21/15/0 24/0/0
Lubricating, U.S.		6/0/0 7/0/0
Do. refined		7/10/0 12/0/0
TAR—Stockholm	barrel	1/1/6 1/2/0
Archangel		0/13/6 0/0/0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

ABERDARE.—For alterations to Nos. 3 and 4, Cardiff-street, for the Aberdare Co-operative Society, Limited. Mr. Charles H. Elford, architect, 15, Cardiff-street, Aberdare:—

John Morgan	£537 0 0
Jones & Charles, 22, Wind-street, Aberdare*	439 0 0

* Accepted.

ABERTILLERY (Mon.).—For the erection of an infant school at Six Bells Village, for the Llanhilleth School Board. Mr. Jas. McBean, architect, Abertillery, R.S.O. (Mon.):—

A. P. Williams	£1,260
William Jones & Son, Newport, Mon. (accepted)	997

ACTON.—For the erection of a house and laundry, Park-road, North Acton, for Mr. H. Hawkes. Mr. Thos. S. Stephens, architect, Acton:—

W. Neil	£1,188	H. G. Heywood (accepted)	£1,048
F. Colwill & Co.	1,100	J. Jackson	1,038
A. Morgan	1,070	R. Barclay	748

[Architect's estimate, £1,060].

ALTRINCHAM.—For the construction of a 12-in. pipe sewer along Back-lane, Timperley, for the Union Rural Sanitary Authority. Mr. McKenzie, Surveyor, Lossie Bank, Hale, near Altrincham:—

Geo. Bozson	£165	W. Barton, Altrincham*	£135
Jas. Hamilton	157	G. Bemerson	120

* Accepted.

BANGOR (Co. Down).—For forming and completing outfall sewer and three new roads, for Mr. R. E. Ward, D.L., Bangor Castle; Mr. Daniel Drew, J.P., Belfast; and Mr. John Moore, Belfast. Mr. John Russell, engineer, 16, Waring-street, Belfast:—

Wm. Geddis	£4,365 0 0	Workman & Green	£2,608 14 1
W. H. Campbell	3,927 10 0	J. Ross & Son	2,543 15 2
Charles Ritchie	3,533 0 0	Thos. MacMurray, Warrenpoint*	2,404 10 3
F. Quinn	3,227 7 4		
John Stewart & Son.	3,175 10 0		

* Accepted.

For outfall sewer and Mr. Moore's one road only.
—J. Colville, Bangor £741 7 9

BECKENHAM.—For alterations and additions to the "Ferns," Beckenham. Mr. Newton Dunn, architect:—

Andrew & Nanson	£802 0	Syme & Duncan	£512 0
Maxwell Bros.	547 0	Coffin	451 11
Peacock Bros.	515 0	Carmichael	480 0

BOVEY TRACEY (Devon).—For the erection of a shop and dwelling-house, for Mr. Peters. Mr. Samuel Segar, architect, Union-street, Newton Abbot:—

Gibson	£1,230 0 0	Blackmore	£947 0 0
Wills Bros	1,043 7 0	Brimblecombe	943 0 0
Zealley	1,035 0 0	Vanstone	932 0 0
Winser	1,031 5 0	Yeo	875 0 0
Palfrey & Davie	1,030 0 0	Bearne	873 0 0
Stacey	1,022 0 0	Barrow, Newton Abbot (accepted)	794 0 0
Gooding	970 9 6		

BRISTOL.—For the erection of mission buildings in St. Philip's District. Mr. John Bevan, architect, 4, Unity-street, Bristol:—

T. H. Brown	£2,286	W. Church	£2,044
Easterbrook & Sons	2,220	O. E. Davis	2,034
Stephens & Bastow	2,129	E. T. Hatherley	1,997
A. G. Forse	2,100	J. Perkins	1,990
E. Walters	2,100	R. Wilkins & Sons	1,945
Cowlin & Son	2,067	J. Perrott	1,900

[All of Bristol.]

BRISTOL.—For the construction of a bakehouse and store at Bishopston, Bristol, for Mr. S. Curtis. Mr. A. P. I. Cotterell, architect, 7, Baldwin-street, Bristol:—

J. Bastow	£990 0 0	C. Chorley & Son*	£951 0 0
Wilkins & Sons	984 0 0		

*Accepted.
[Architect's estimate, £954.]

CHISLEHURST.—For additions and alterations at private residence, Chislehurst, Kent. Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street, E.C.:—

W. Holt & Son	£142 10	F. Wood	£124 12
Somerford & Son	132 0	R. A. Lowe	120 0
T. Crossley	125 10	D. Payne, Bromley*	106 0

* Accepted.

COOKHAM.—For alterations and additions to Moor Hall, for Mr. Frank D. Lambert. Mr. Edward Hide, architect, New City Chambers, 121, Bishopsgate-street, E.C. Quantities by Mr. Edward J. Paine, 11, Great James-street, W.C.:—

Brass & Son	£5,320	Cooper & Sons	£4,420
Peto Bros.	5,071	Cox & Co.	4,275
J. Woodbridge	4,875	Silver & Sons, Maidenhead (accepted)	4,160
Norris & Son	4,854		

COVENTRY.—For alterations and additions to the male sick wards, &c., at the workhouse at Meriden, for the Meriden Union Guardians. Mr. H. W. Chattaway, architect, Trinity-churchyard, Coventry:—

C. Garlick	£490 0 0	W. Moss	£390 0 0
S. Downs	400 0 0	C. Hope	383 0 0
W. Green	390 0 0	C. J. Hill, Coventry*	380 0 0

* Accepted.

CROYDON.—For the erection of a factory in Church-road, Croydon. Mr. Henry Gough, architect, Station-road, West Croydon:—

W. Marriage	£2,875	A. Bullock	£2,555
Hort Bros.	2,745	M. Taylor	2,523
Kingerlee	2,738	E. J. Saunders	2,500
Holt & Son	2,600	E. P. Bulled & Co.	2,462
W. Smith	2,590	D. W. Barker	2,333
S. Page	2,567		

FARNBOROUGH (Kent).—For the erection of shop and stables at Farnborough, Kent. Mr. G. St. Pierre Harris, architect and surveyor, 1, Basinghall-street, E.C.:—

W. Owen, Farnborough	£100 0 0

[Accepted; no competition.]

GATESHEAD.—For the erection of a residence at Low Fell, Gateshead-on-Tyne, for Mr. Benjamin D. Raine. Mr. Thos. Reay, architect, 95, Pilgrim-street, Newcastle-on-Tyne:—

Nobe & Waugh	£1,097 7 9	Robert Henderson	£814 10 0
F. Wakefield	926 0 0	Thos. Gardner, Gateshead (accepted)	792 17 0
Thos. Robson	860 17 0		

GRAYS.—For erecting office in the New-road, for Mr. H. Porter. Mr. H. Seager, architect, Gravesend:—

Brown	£170 0 0	Carter	£138 12 6
C. Rous	157 0 0	[Architect's Estimate, £150.]	

HEXHAM.—For the erection of new premises, Cattle Market, Hexham, for Dr. Stainthorpe, credit being given in the amounts of the tenders for the old material upon the site. Quantities by Messrs. Boreham & Morton, Sunderland. Mr. Henry Grieves, architect, Albany Chambers, South Shields:—

H. Brown & Co.	£2,493 0 0	Ed. Snowball	£2,222 0 0
J. Elliott	2,435 0 0	W. & J. Darlington	2,172 0 6
Wm. Scott	2,374 18 5	J. Civil, Hexham (accepted)	2,113 0 0
Rutherford & Armstrong	2,232 0 0	R. Atkin	1,997 0 0

LEITH.—For work in the erection of a school at Craighall-road, Leith, for the School Board. Mr. Geo. Craig, architect, 79, Duke-street, Leith:—

Mason Work.—A. & W. Fingzies, Leith	£7,320 0 0
Carpenters.—W. & J. R. Watson, Edinburgh	3,750 0 0
Ironwork.—Peter Bell & Son, Edinburgh	798 17 8
Slaters.—W. & S. Christie, Leith	172 0 0
Plaster, Cement, and Tile.—P. F. Cavanagh, Edinburgh	1,729 0 4
Plumbers and Gasfitters.—Thos. McPherson, Leith	912 0 0
Painters.—Hadden & Son, Leith	285 16 9½
Heating.—Lowe & Son, Edinburgh	292 0 0

LONDON.—For the erection of factory, Golden-lane, E.C., for Messrs. I. & R. Morley. Contract No. 2. Mr. H. J. Treadwell, F.S.I., architect:—

		Add Alternative Estimate for Fronts.	Credit.
Peto Bros.	£29,952	£1,761	£520
Dove Bros.	29,270	1,740	580
Bywaters	29,187	1,846	460
Brown, Son, & Blomfield	28,530	1,896	490
Ryder & Son	28,148	1,982	480
Colls & Son	27,965	1,720	480
Ashby Bros.	27,439	1,864	600

LONDON.—For alterations at the premises of the Central Bank of London, Whitechapel Branch. Mr. Herbert Knight, architect, 129, Cheapside, E.C.:—

Hearle & Son, Whitechapel (accepted)	£1,998 10 0

LONDON.—For the erection of baths and washhouses in the Caledonian-road, N., for the Commissioners of Baths and Washhouses for the Parish of St. Mary, Islington, N. Mr. A. Hessell Tiltman, architect. Quantities supplied by Mr. J. Leaming :—

Williams & Sons	£18,450	Brass & Son	£16,777
Nightingale	17,230	Balaam	16,329
Stimpson	17,230	Thos. Turner, Limited	16,250
Todd	16,895	J. Allen & Sons	15,665
Chessum & Sons	16,870	J. O. Richardson, Albert Works, Peckham*	14,933
Kirk & Randall	16,848		
Willmott & Sons	16,800		

*Accepted.

LONDON.—For erecting new stores, offices, and entrance at the Eastern Hospitals, Homerton. Mr. Keith D. Young, architect. Quantities supplied by Mr. W. T. Farthing :—

J. O. Richardson	£7,009	Godson	£5,625
Stephens & Bastow	6,997	Balaam	5,588
Evre	6,958	Allen & Sons	5,546
Wall	6,289	Chessum	5,529
Mollett	5,975	Wells (accepted)	5,483
Lawrance & Sons	5,656	Hughes	5,391

LONDON.—For the completion of the upper stage of the tower and spire of St. Mary's Church, Newington, Surrey. Mr. James Fowler, architect, Louth, Lincolnshire :—

	Tower.	Spire.	Total.
Higgs & Hill	£2,100	£1,260	£3 360
D. Charteris	1,817	1,283	3,100
B. E. Nightingale	1,876	1,189	3 065
Cornish & Gaymer	1,875	1,780	3,655
Dove Brothers	1,785	1,210	2,995
Chas. Baines	1,836	1,097	2,933
Rudd & Son	1,775	1,025	2,800

LONDON.—For repairs, decoration, &c., at the "Horse Shoe" Hotel, Tottenham-court-road. Mr. J. M. Knight, architect :—

Maple	£3,218 19 2	Shoolbred	£2,011 15 0
Patman & Fotheringham	2,894 0 0	Gladding	1,940 0 0
		Foxley	1,670 0 0
Bywaters	2,277 0 0	Ashby Bros.	1,638 0 0

LONDON.—For the erection of a studio at Stewart's-grove, Chelsea. Mr. Alfred J. Best, architect, 17, Sloane-street, S.W. :—

Carl Tabow	£745 0	T. Channing	£494 0
Green & Green	670 0	W. Keen	494 0
C. Emmett	615 10	R. G. Battley	479 0
G. W. Richardson & Son	570 0	Scharlen & Co.	468 0
Garratt & Son	550 0	R. Barclay	439 0
Rice & Son	525 0	Stewart & Co., Walworth*	397 10

* Accepted.

LONDON.—For alterations to Nos. 16 and 17, High Holborn, for Messrs. Payne & Son. Mr. Edward J. Paine, architect, 11, Great James-street, W.C. No quantities :—

Stimpson & Co.	£447	J. T. Bassano (accepted)	£340
E. Houghton & Son	434		

LONDON.—For additions and alterations to Nos. 13, Upper Brook-street, and 80, Park-street, W., for the Right Hon. the Earl of Shrewsbury and Talbot. Mr. T. Tayler Smith, architect, 4, Circus-place, E.C. Mr. Henry Bushell, surveyor, 1, Finsbury-circus, E.C. :—

Lascelles & Co. (accepted, at per schedule of prices.)
[No competition.]

MORDEN.—For deep drainage of New Cemetery, at Morden, for the Battersea Burial Board :—

Geo. Bell	£4,265 0	Botterill	£3,360 0
Neave & Son	4,237 0	W. Cunliffe, Kingston-on-Thames (accepted)	3,153 15
King	4,234 0		

NEWCASTLE-ON-TYNE. — For rebuilding Felstone Church, North Tyne, for the Rev. R. Picton, R.N. Messrs. Plummer & Burrell, architects, 46, Cloth Market, Newcastle-on-Tyne :—

Middlemiss	£2,113 0 0	Carse & Son	£1,422 1 7
Brown	1,992 3 9	Martinson & Welton, North Tyne*	1,312 11 10
Weightman	1,941 7 11		
Robinson	1,640 0 0	J. Aynsley	1,277 4 0
T. Craggs	1,621 17 7	W. Smith	1,275 7 11
F. Caldcleugh	1,464 0 0		

* Accepted.

NEW FOREST (Hampshire).—For the enlargement of Milton Hotel, for Mr. Hugh Wyeth. Messrs. John Colson & Son, architects, 45, Jewry-street, Winchester. Quantities by Mr. J. B. Colson :—

F. Hoare & Sons	£1,560	H. Stevens & Co.	£1,150 0 0
H. I. Sanders	1,375	Hammerton & White	1,147 15 0
W. Hoare	1,250	Bull & Sons, Limited	1,133 0 0
Jenkins & Sons	1,158		

NEWPORT (Mon.)—For re-building the "Alexandra Inn," Commercial-road, for Messrs. Hancock & Co., Limited. Messrs. W. G. Habershon & Fawckner, architects, Park-square, Newport, Mon. :—

Wm. Price	£1,794	John Linton (accepted)	£1,620
W. M. Blackburn	1,747		

[All of Newport.]

NORFOLK.—For the erection of police-stations at Wells and Harleston, Norfolk, for the Norfolk County Council. Mr. T. H. B. Heslop, C.E., County Surveyor, Norwich. Quantities supplied :—

Wells.

Spinks	£1,450 0 0	W. J. Larner	£1,164 12 6
Wm. Jarvis	1,213 10 0	R. Mayes, East Dereham (accepted)	1,123 0 0
T. H. Blyth	1,198 0 0		

Harleston.

Arthur Rayner	£998 0 0	Hy. Brett	£822 13 0
T. H. Blyth	856 3 0	S. G. Brock & Son, Aldburgh, Harleston (accepted)	765 0
Smith & Watling	833 0 0		
Richard Mayes	829 0 0		

ORPINGTON.—For conservatory and greenhouse at private residence, Orpington, Kent. Mr. St. Pierre Harris, architect and surveyer, 1, Basinghall-street, E.C. :—

Conservatory.

Somerford & Son*	£191 15	Kinnell & Co.* (heating)	£26 15

Greenhouse.

Somerford & Son	£122	T. Knight*	£81
W. Owen	98		

*Accepted.

ORPINGTON.—For additions to shop and erection of stables at Orpington, Kent. Mr. St Pierre Harris, architect :—

Somerford & Son £665 0 0

SHEFFIELD.—For the erection of a chimney stack 120 ft. in height, for Messrs. J. Gregory & Co., Deepcar, nr. Sheffield. Messrs. Fowler & Marshall, architects, George-street, Sheffield. Quantities supplied :—

Henry Freckingham	£140	Joseph Walker, Deepcar*	£105
John Woodward	130		

* Accepted.

SOUTH FEATHERSTONE (Yorks).—For additions to school, Regent-street, for the Featherstone School Board. Mr. S. H. Garside, architect, Ackworth-road, Pontefract :—

Geo. Barstow & Son	£231 16 6	Wm. Denison, Normanton (accepted)	£169 0 0
W. & C. Wilcock	225 0 0		

TOTTERIDGE (Herts).—For additions and alterations to farmhouse and buildings at Gladwin's Farm, Totteridge, Herts, for Col. Puget. Mr. Arthur T. Wrighton, architect, 26, Bridge-row :—

Phillips	£2,025	Isaacs	£1,829
Courtney & Fairbairn	1,942	C. Plowman	1,771

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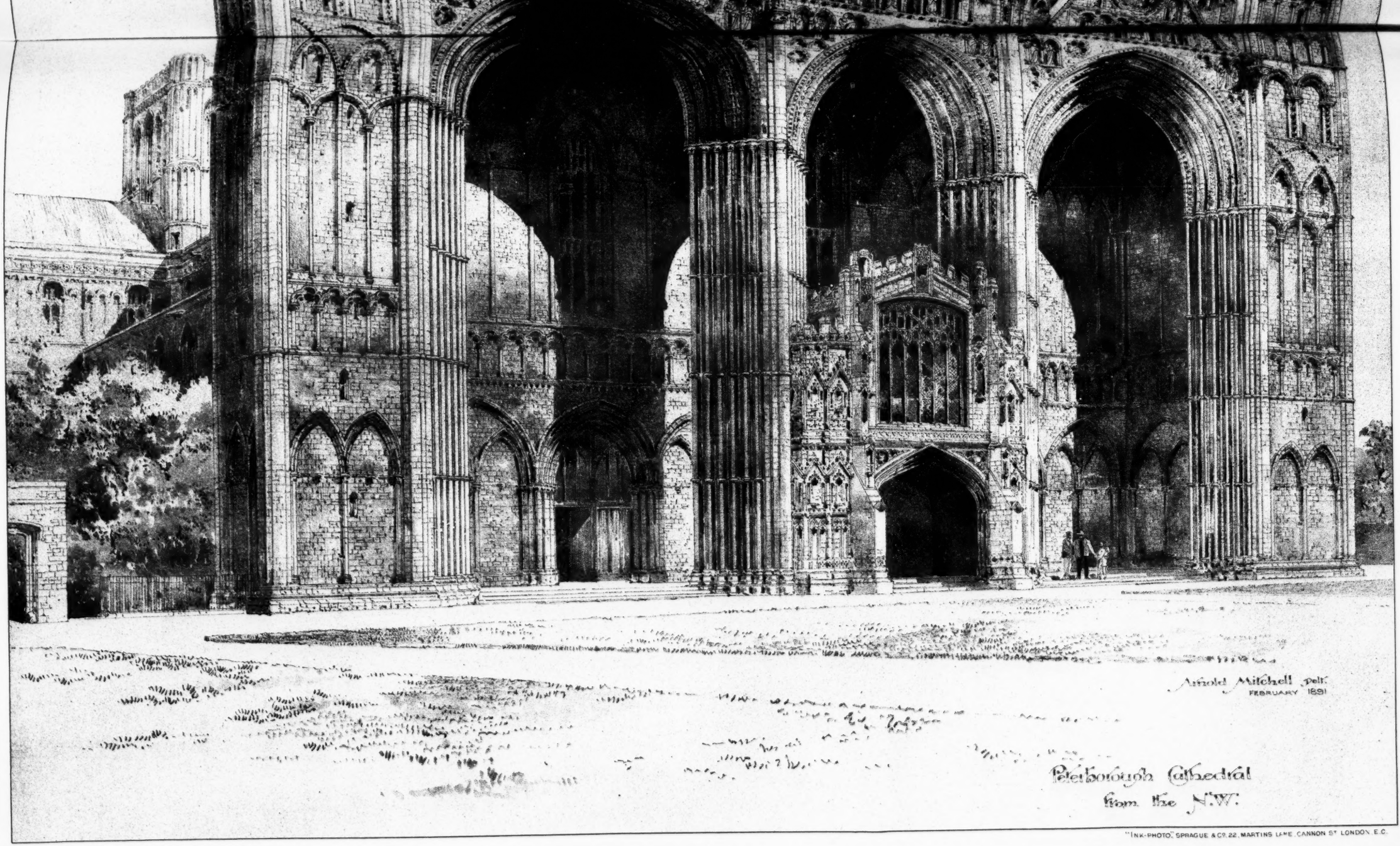

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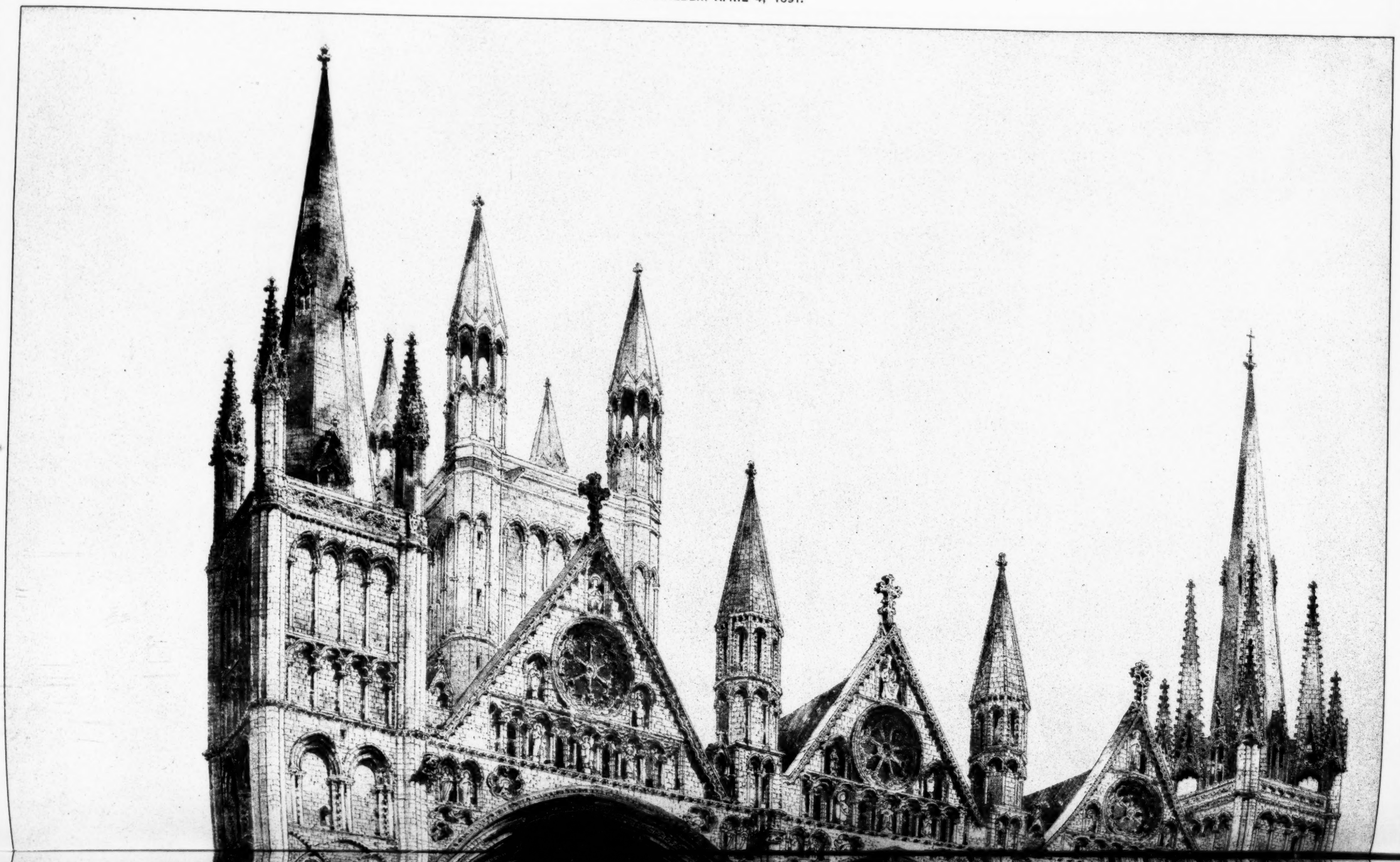

THE CATHEDRAL CHURCH OF ST. PETER, PETERBOROUGH.

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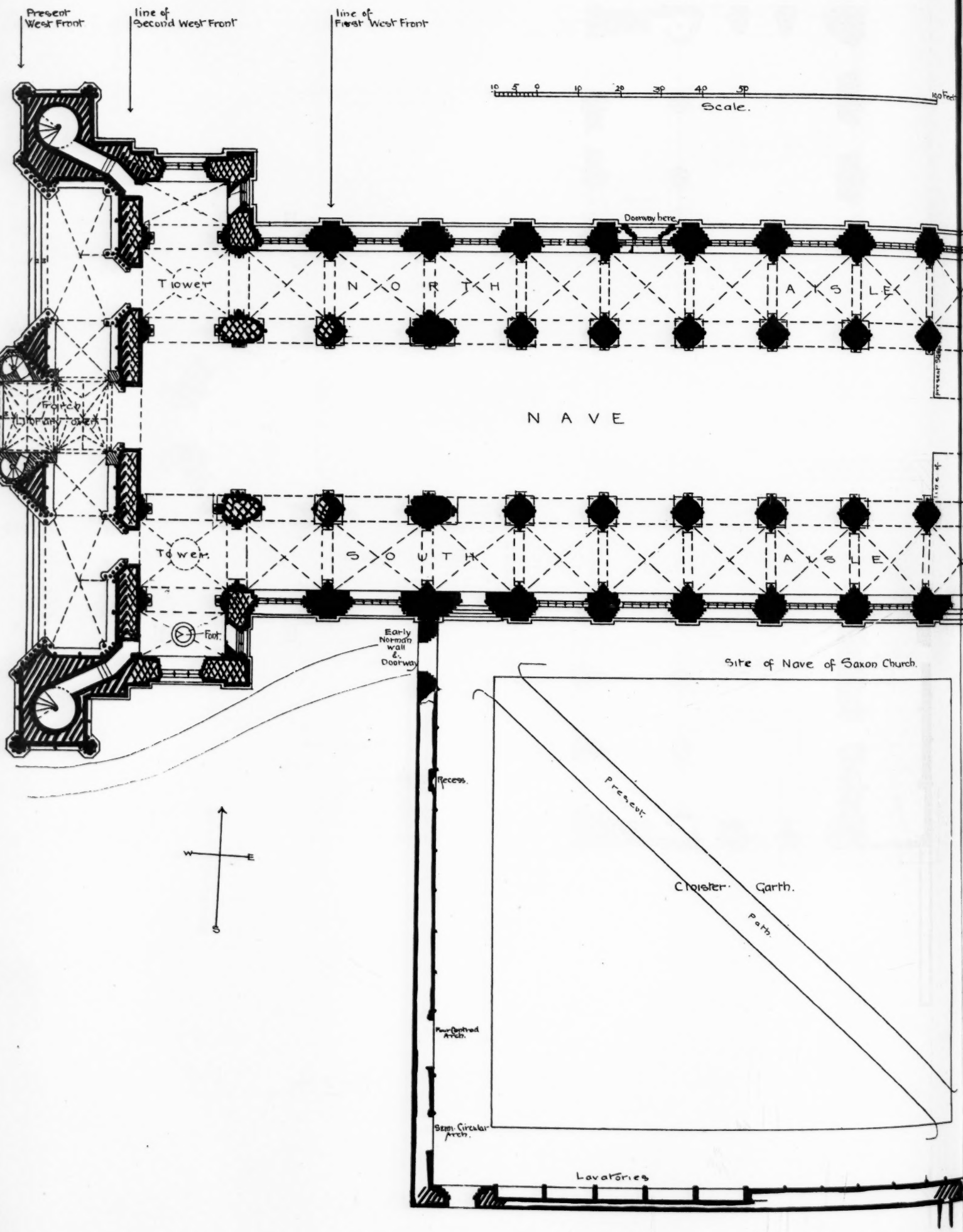

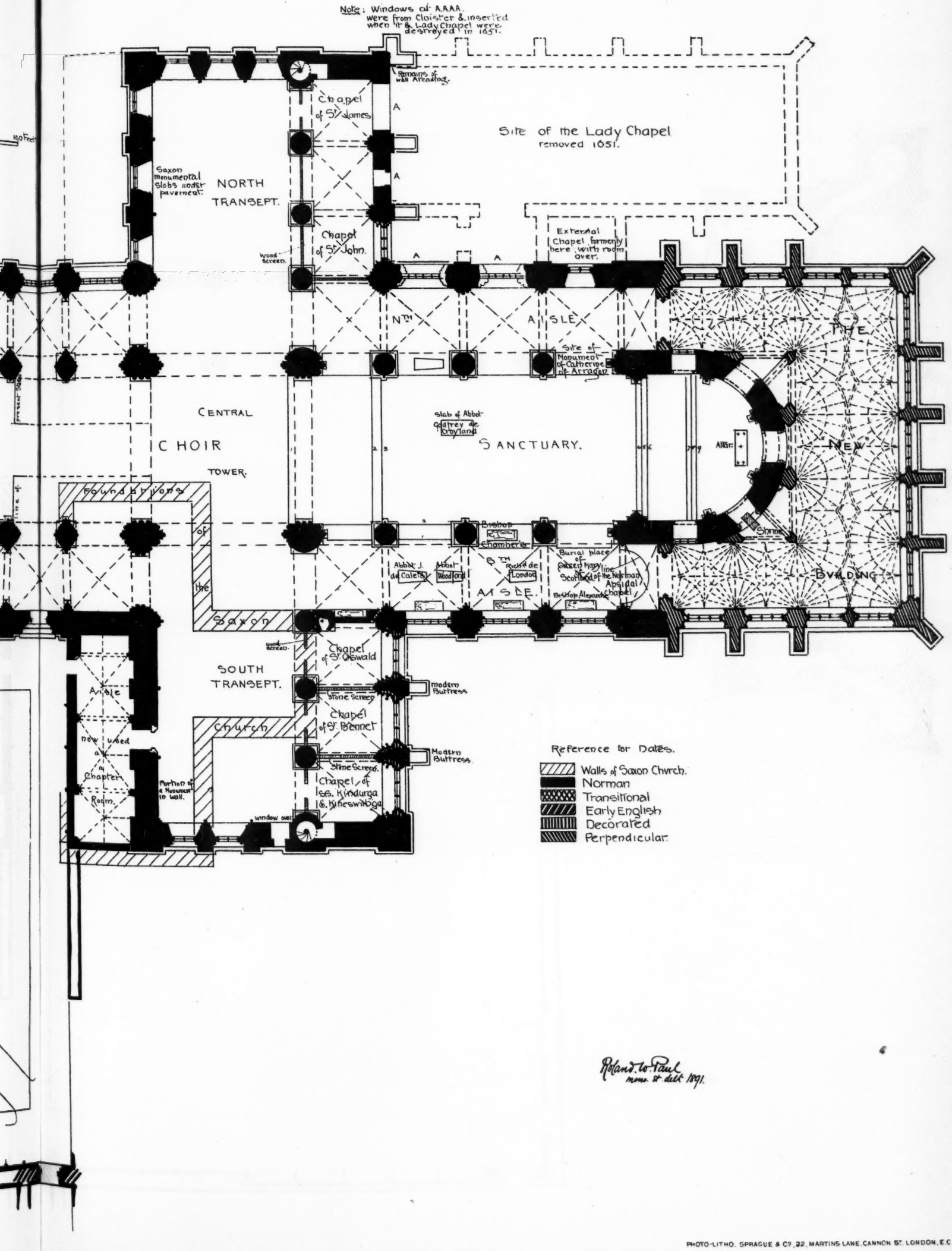

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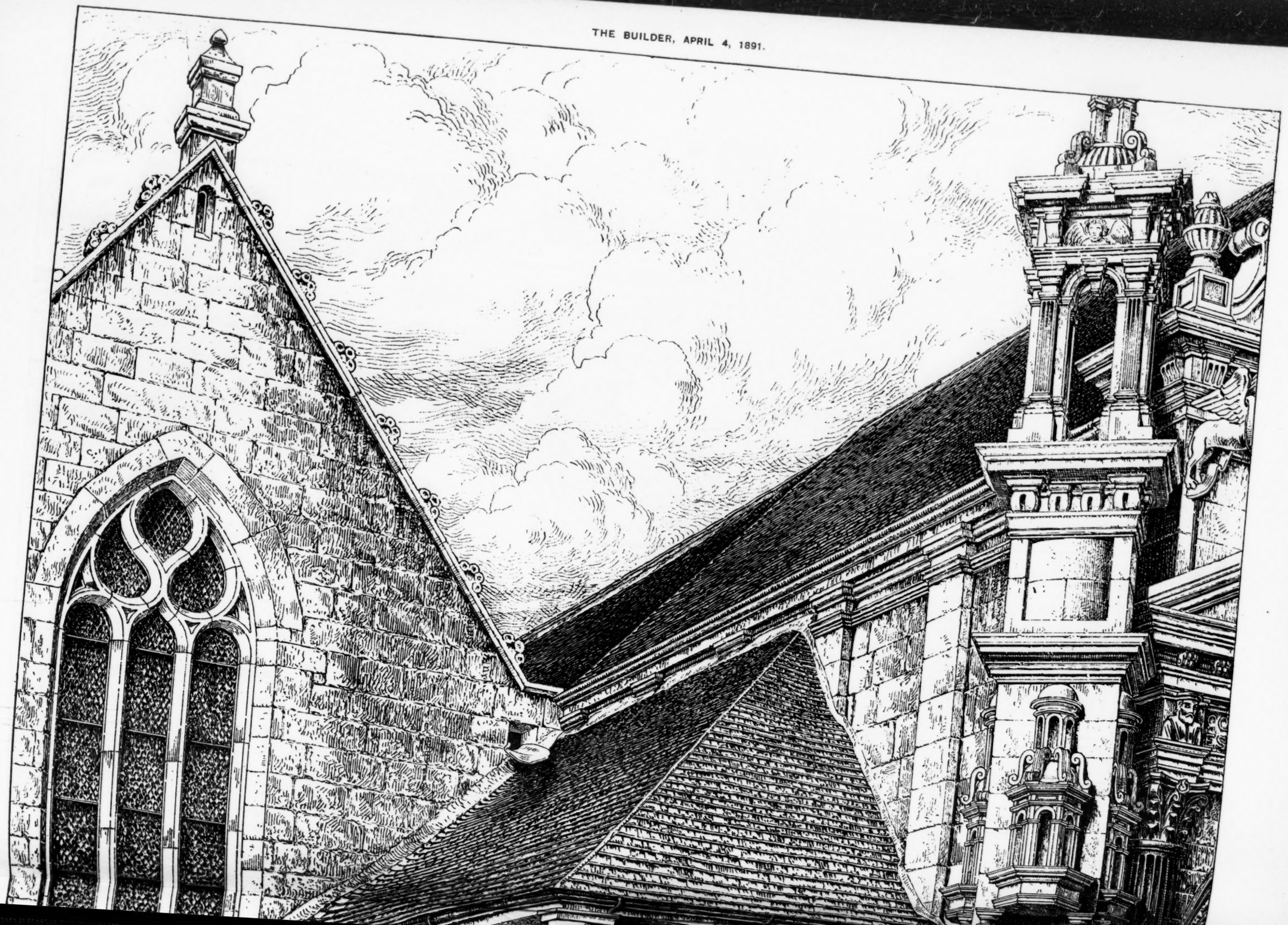

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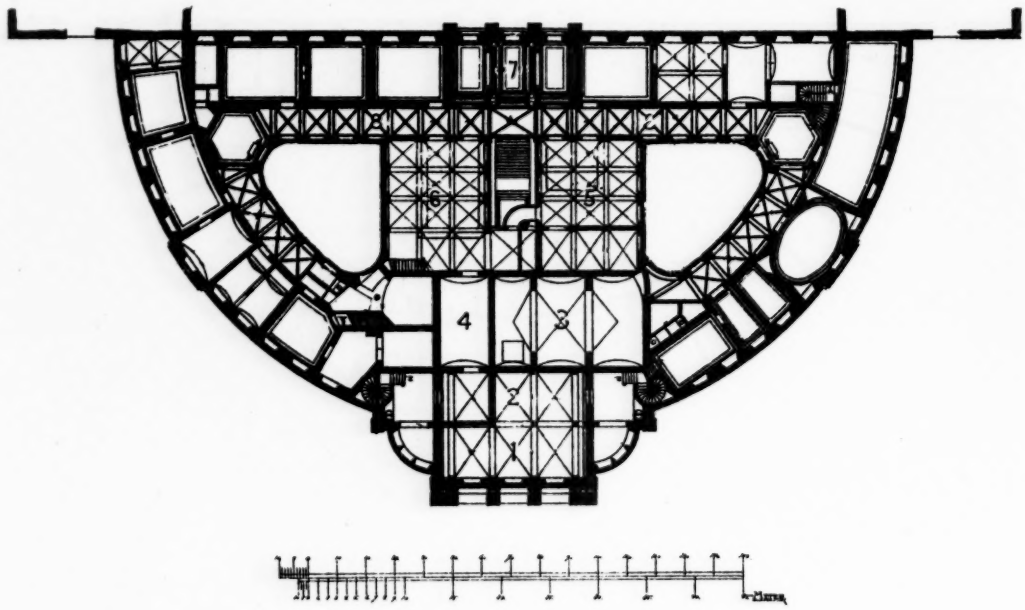
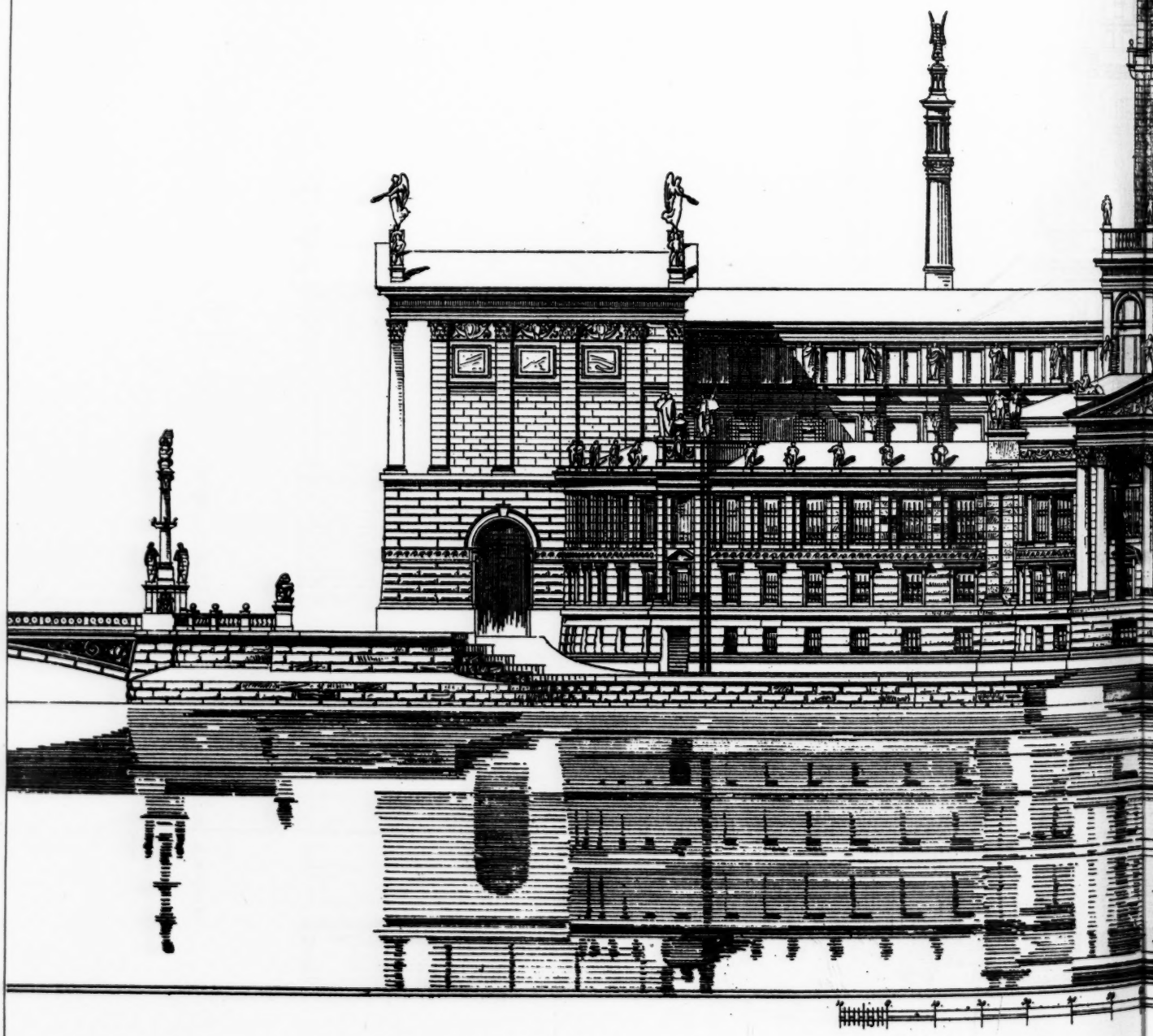


ENTRANCE FLOOR OF BANK.



SWEDISH HOUSES OF PARLIAMENT AND BANK

FAÇADE TO

GROUND FLOOR OF BANK.

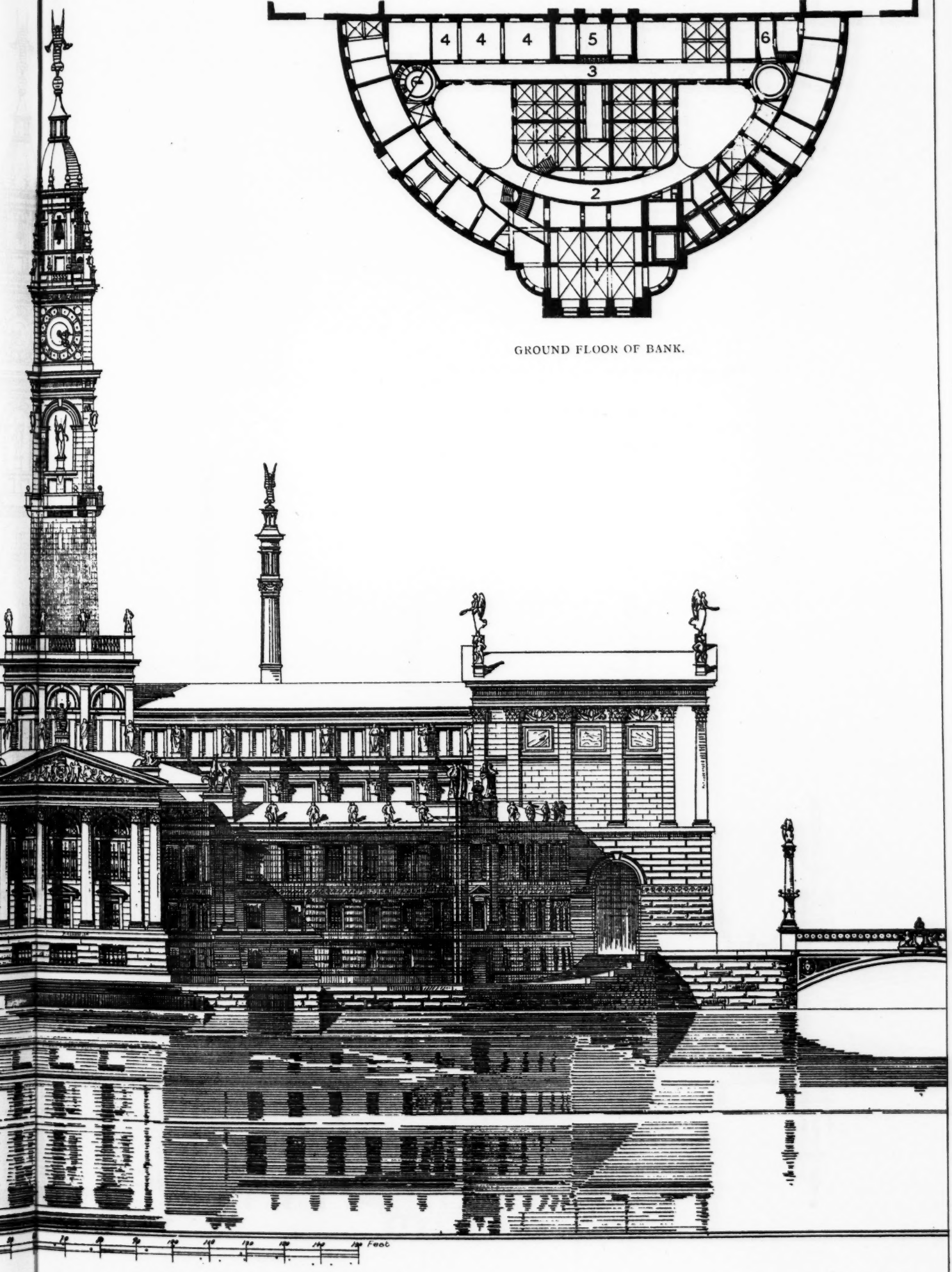


PHOTO LITHO. SPRAGUE & Co., 22, MARTINS LANE, CANNON ST. LONDON, E.C.

BANK OF SWEDEN.—HERR HELGO ZETTERVALL, ARCHITECT.
DE TO VASA BRIDGE.